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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 5

77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

179961

000001

REPLY TO THE ATTENTION OF

DATE: JUN 28 2002

SUBJECT: ACTION MEMORANDUM - Request for a Ceiling Increase and a CERCLA Removal Action Exemption to the \$2 Million Statutory Limit for the Western Mineral Products Residential Site, Minneapolis, Hennepin County, Minnesota (Site ID #B5P2)

FROM: Sonia R. Vega, On Scene Coordinator
Emergency Response Section 3, U.S. EPA

TO: William E. Muno, Director
Superfund Division

THRU: Richard Karl, Chief *R. Karl*
Emergency Response Branch

I. PURPOSE

The purpose of this memorandum is to request an exemption from the \$2 million statutory limit, and to request a ceiling increase of \$1,860,867 to continue Phase II of the time-critical removal action at the Western Mineral Products Residential Site located in and around Minneapolis, Hennepin County, Minnesota. The increase will bring the total project ceiling to \$3,584,141. If approved, the additional ceiling will be used to complete more than 700 new inspections, and to conduct the necessary removal actions identified through those inspections. On September 21, 2000, William E. Muno, Director, Superfund Division, signed the original Action Memorandum, and on July 27, 2001, and September 13, 2001, Mr. Muno signed amendments to the original Action Memorandum to document approval to conduct Phase II of the time-critical removal action, and to document ceiling increase and exemption from the 12-month statutory limit, respectively.

In order to bring this site to a closure, the U.S. EPA publicly announced that June 1, 2002, was the deadline for the public to request visual inspection of their yards and driveways for the presence of vermiculite processing waste products at surface level. This deadline was intended to allow U.S. EPA to identify all potential locations and to complete the remainder of the project before winter. The response was overwhelming. More than 700 new inspection requests were received by the deadline. Past experience showed between a 10 to 15% inspection to clean up ratio. It is estimated that about an additional 138 residential properties will require outdoor clean up actions this year.

Section 104(c) of the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA) sets a statutory 12-month and 2 million dollars for a removal action. If these limits are exceeded an exemption may be sought if the removal action meets the three components found in Section V of this Action Memo.

This site is not on the National Priorities List.

II. SITE CONDITIONS AND BACKGROUND

CERCLIS ID# MNN 000 508 056

A. Site Description and Background

Refer to Action Memorandum dated September 21, 2000, and amended Action Memoranda dated July 27, 2001 and September 13, 2001, attached, for a description of Site conditions and the response actions selected for the Site.

B. Actions to Date and Current Situation

Please refer to Action Memorandum dated September 13, 2001, for a detailed description of activities performed during Phase I and the first part of the Phase II of the clean up action. Since the issuance of the September 13, 2001, Action Memorandum, and as of June 14, 2002, U.S. EPA has completed the following:

1. 414 property inspections.
2. Vacuumed 2 alley ways.
3. Excavated and restored 48 residential properties.
4. Identified 63 additional residential properties for clean up.
5. Received more than 724 inspection requests.

C. Request for Ceiling Increase

The original Action Memorandum, dated September 21, 2000, estimated that approximately 30 residential properties would require clean up actions in Phase I of the project. During Phase I, U.S. EPA actually identified 45 properties requiring clean up, 34 of which were addressed during Phase II, in addition to 43 additional properties that were identified for clean up during Phase II, which began on July 27, 2001. As of June 14, 2002, a total of 88 residential properties have been cleaned up, 63 have been identified for clean up, and more than 500 await inspection.

In May, 2002, U.S. EPA conducted an aggressive outreach effort. Using direct mailing, press releases, and other media venues, the U.S. EPA announced June 1, 2002 as the

deadline for inspection requests. Over 700 new inspection requests were received by the deadline. Since June 3, 2002, U.S. EPA has been back in the neighborhood conducting visual inspections, and will resume the clean up actions the week of June 17, weather permitting.

A total of 48 properties were identified for clean up last Fall and were not addressed in 2001 due to inclement weather. Since the new inspections started on June 3, 2002, an additional 15 properties have been found with visible contamination at surface level. With more than 500 still to inspect, and based on experience from previous years, it is safe to estimate that an additional 75 properties will be identified for clean up. That would bring the total number of properties requiring clean up actions this year to approximately 138.

III. THREATS TO PUBLIC HEALTH OR WELFARE OR THE ENVIRONMENT, AND STATUTORY AND REGULATORY AUTHORITIES

For more detailed information, refer to the attached Action Memorandum and amendments dated September 21, 2000, July 27, 2001, and September 13, 2001.

The conditions at the residential component of the Western Mineral Products Site meet the criteria for a removal action as stated in the National Contingency Plan (NCP), Section 300.415(b)(2), specifically:

- i) Actual or potential exposure to nearby human populations, animals, or the food chain from hazardous substances or pollutants or contaminants;

The concentration of asbestos contaminated materials found in the residential alleys, and in surface soils indicate a potential for human exposure.

- iv) High levels of hazardous substances in soils largely at or near the surface, that may migrate;

Pieces of amphibole asbestos are visible at the surface on residential sites.

- v) Weather conditions that may cause hazardous substances or pollutants or contaminants to migrate or be released;

Temperature, winds and runoff may contribute to the dispersion of contaminated materials.

- vii) The (lack of) availability of other appropriate federal or state mechanism to respond to the release;

No other local, state or federal agency is in the position or currently has the resources to independently implement an effective response action.

IV. ENDANGERMENT DETERMINATION

Given the Site conditions, the nature of the suspected hazardous substances on Site, and the potential exposure pathways described in Sections II and III above, actual or threatened releases of hazardous substances from this Site, if not addressed by implementing and completing all of the response actions selected in these Action Memorandum and amendments dated September 21, 2000, July 27, 2001, and September 13, 2001, may present an imminent and substantial endangerment to public health, or welfare, or the environment.

V. EXEMPTION FROM STATUTORY LIMITS

CERCLA Section 104 (c) states that removal actions can exceed the 12-month and the 2 million dollar statutory limit if conditions meet either the "emergency exemption" criteria or the consistency criteria. On September 13, 2001, William E. Muno, Director, Superfund Division, signed an amendment to the original Action Memorandum to document approval of an exemption from the 12-month statutory limit. As described above, the environmental and workload conditions requiring the exemption from the 12-month limit still exist for the Site. Conditions at the Western Mineral Products Site also warrant the exemption from the 2 million dollar statutory exemption based on the following factors:

EMERGENCY WAIVER

1. "There is an immediate risk to public health or welfare or the environment;"

High levels of asbestos contaminated materials are present at surface level on residential properties which are easily accessible to the public. The risks presented by this material are described in detail in the Action Memorandum dated September 21, 2000.

2. "Continued response actions are immediately required to prevent, limit, or mitigate an emergency;"

For reasons stated above, this component applies. Because of the expanded number of homes identified for cleanup, the removal action will take more than 2 million dollars to complete.

3. "Assistance will not otherwise be provided on a timely basis;"

Neither state nor local agencies have any resources to complete the remaining removal actions at this Site.

VI. PROPOSED ACTIONS AND ESTIMATED COSTS

a. Proposed Actions

The purpose of the continuation of this removal action is to mitigate the imminent and substantial threats posed to public health or welfare or the environment. Removal activities at the Site will include identification of other residential properties that require clean up actions, the removal and proper disposal of asbestos contaminated materials from these properties, and restoration of excavated areas. Specifically:

1. Develop and implement the Site-specific health and safety plan;
2. Determine the horizontal extent of asbestos contamination in the contaminated residential properties and identify areas to be remediated;
3. Excavate and remove asbestos contaminated materials to a maximum depth of 18 inches in the yards and alleys;
4. Dispose of the contaminated materials at an EPA-approved disposal facility in accordance with the EPA Off-Site Rule, 40 CFR § 300.440, 58 Federal Register 49215 (September 22, 1993);
5. Remove asbestos from the surface of paved alleys and driveways for disposal;
6. Perform personal and perimeter air monitoring during remediation activities;
7. Implement dust control measures during the remediation activities;
8. Install a synthetic liner at the bottom of the excavated areas prior to backfill;
9. Analyze bulk asbestos samples using standard Polarized Light Microscopy (PLM) methods. Supplement PLM analysis with Transmission Electron Microscopy (TEM).
10. Backfill excavated areas with clean soil and restore property to original pre-removal conditions.

For the purposes of the Phase II removal action, cleanups will take place at properties where significant visible asbestos contamination is present and those where a surface sample collected from the property indicates significant asbestos content, even if there

is no visible contamination.

At this point is hard to estimate the duration of the project. On average, each property requires 1.5 days of on-site work to remediate. As of June 11, 2002, U.S. EPA has identified 63 properties requiring clean up. There are an additional 500 properties to be inspected. Past experience showed a 15% inspection to clean up ratio.

Additional funding will be needed to complete this cleanup, due to the increase in the estimated number of contaminated properties to be addressed.

The response actions described in this memorandum directly address actual or threatened releases of hazardous substances, pollutants, or contaminants at the residential properties which may pose an imminent and substantial endangerment to public health and safety and to the environment.

b. Estimated Costs

The following cost estimates include costs associated with the completion of Phase II of the residential removal action. The estimate is based on the costs incurred so far since the beginning of Phase II. Costs are projected as follows:

EXTRAMURAL COSTS:

<u>Regional Removal Allowance Costs:</u>	\$ 1,052,066
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Total Cleanup Contractor Costs
Includes a 15% contingency.

Other Extramural Costs Not Funded from the Regional Allowance:

Total START	\$ 117,600
Subtotal	117,600
Subtotal, Extramural Costs	\$ 1,169,666
Extramural Costs Contingency (10% of Subtotal, Extramural Costs)	+ \$ 116,966

TOTAL, REMOVAL ACTION PROJECT CEILING	\$ 1,286,632
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VII. EXPECTED CHANGE IN THE SITUATION SHOULD ACTION BE DELAYED OR NOT TAKEN

Increased risk to public health and the environment will result if no or delayed action ensues. There would be continued exposure to high levels of asbestos in the soil by humans or animals.

VIII. OUTSTANDING POLICY ISSUES

None.

IX. ENFORCEMENT

Enforcement efforts are documented in the original Action Memorandum for this Site.

The total EPA costs for this removal action based on full-cost accounting practices that will be eligible for cost recovery are estimated to be \$ 1,860,867.¹

$$(1,286,632 + 50,100) + (39.21\% \times 1,336,732) = \$ 1,860,867$$

¹ Direct Costs include direct extramural costs and direct intramural costs. Indirect costs are calculated based on an estimated indirect cost rate expressed as a percentage of site specific direct costs, consistent with the full cost accounting methodology effective October 2, 2000. These estimates do not include pre-judgment interest, do not take into account other enforcement costs, including Department of Justice costs, and may be adjusted during the course of a removal action. The estimates are for illustrative purposes only and their use is not intended to create any rights for responsible parties. Neither the lack of a total cost estimate nor deviation of actual total costs from this estimate will affect the United States's right to cost recovery.

X. RECOMMENDATION

This decision document represents the selected removal action for the Phase II of the residential time-critical removal at the Western Mineral Products Site in Minneapolis, Hennepin County, Minnesota, developed in accordance with CERCLA, as amended, and is not inconsistent with the NCP. This decision is based upon the Administrative Record for the site. Conditions at the Site meet the NCP Section 300.415(b)(2) criteria for a removal action and the CERCLA Section 104(c) emergency exemption, and I recommend your approval of the proposed exemption from the \$2 million limit, and ceiling increase. You may indicate your decision by signing below.

APPROVE: _____


Director, Superfund Division

DATE: _____



DISAPPROVE: _____

Director, Superfund Division

DATE: _____

Attachments

1. Update to the Index to the Administrative Record
2. Action Memorandum dated 9/21/2000
3. Action Memorandum dated 7/27/2001
4. Action Memorandum dated 9/13/2001
5. Clean Up Contractor Costs
6. Enforcement Addendum

cc: K. Mould, U.S. EPA HQ, 203-G
M. Chezik, U.S. Dept. of the Interior, **w/o Enforcement Addendum**
J. Connell, Minnesota Pollution Control Agency, **w/o Enforcement Addendum**

Karen Studders, **w/o Enforcement Addendum**
Commissioner's Office
Minnesota Pollution Control Agency
520 Lafayette
St. Paul, Minnesota 55155-4194

Rita Messing, Ph.D., **w/o Enforcement Addendum**
Minnesota Department of Health
121 E. 7th Place
St. Paul, Minnesota 55101

Rodney Sando, **w/o Enforcement Addendum**
Commissioner's Office
500 Lafayette
St. Paul, Minnesota 55155-4037

BCC PAGE

REDACTED

NOT RELEVANT TO THE SELECTION OF THE REMOVAL ACTION

Attachment 1

Cleanup Contractor Costs

Personnel	\$ 114,000
Equipment	\$ 33,000
Disposal	\$ 84,000
Other Direct Costs	\$ 414,000
TOTAL	\$ 645,000

ATTACHMENT 2

**U.S. ENVIRONMENTAL PROTECTION AGENCY
REMOVAL ACTION**

**ADMINISTRATIVE RECORD
FOR
WESTERN MINERAL PRODUCTS SITE
MINNEAPOLIS, HENNEPIN COUNTY, MINNESOTA**

**ORIGINAL
SEPTEMBER 12, 2000**

<u>NO.</u>	<u>DATE</u>	<u>AUTHOR</u>	<u>RECIPIENT</u>	<u>TITLE/DESCRIPTION</u>	<u>PAGES</u>
1	09/11/00	Ecology and Environment, Inc.	U.S. EPA	Letter Report for the Residential Portion of the Western Mineral Products Site	118
2	00/00/00	Zintak, L., U.S. EPA	Muno, W., U.S. EPA	Action Memorandum: Request for a Time- Critical Removal Action Approval at the Western Mineral Products Site (PENDING)	



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

MEMORANDUM [9/6/2000]

SUBJECT: Exposure to amphibole asbestos fiber contamination in residential areas associated with the Western Minerals Products Site in Minneapolis, Hennepin County, Minnesota (Site ID # B5P2) poses an imminent and substantial endangerment to public health.

FROM: Mark D. Johnson Ph.D., DABT.
Regional Toxicologist

TO: Leonard N. Zintak, Jr., On-Scene Coordinator
Emergency Response Section 3

I PURPOSE

This memorandum addresses the rationale for determination of an imminent and substantial endangerment to public health posed by exposure to residual amphibole mineral fiber contamination at the former Western Minerals vermiculite processing facilities and in the residential areas containing waste material generated at the facility. The Western Mineral Products site received process vermiculite ore from the mine in Libby, MT by rail. Expansion of the raw ore occurred inside the building at 1720 Madison Street. Expansion was accomplished by heating the ore, usually in a dry kiln, to approximately 2000 °F, which boiled the water trapped in the crystalline matrix of the vermiculite, thus expanding the material by a factor of 10 to 15 fold. The waste product from the expansion process, also known as "Stoner Rock," was discarded at the loading dock into a large pile on the western side of the facility. A sign indicating that "Free Crushed Rock" was available was located above the pile. Over an estimated period of 40 yrs, local residents were reported to have taken this waste stoner rock material, to be used for a variety of purposes, including garden soil conditioning, driveway and yard fill, sandbox fill material, barbeque grill additive, and indoor insulation. Analysis of soil samples collected by EPA in the area where the former piles occurred show very high concentrations (~20%) of amphibole asbestos. Bundles of this asbestos material are extremely abundant in the surface soil near the loading dock on the west side of the facility.

Mineral fibers of this solid solution series are the focus of the present EPA investigation in

Libby. Amphibole mineral fibers of the tremolite-actinolite-richterite-winchite solid solution series (figure 1, hereafter referred to as 'tremolite, amphibole, or asbestos'), have been found in the Libby ore deposit. Occupational exposure studies of mine workers in Libby have demonstrated that exposure to these tremolite solution series fibers is associated with a significant level of asbestos-related disease (asbestosis, mesothelioma, lung cancer) and death of workers and family members of workers. Investigations of former workers at the Western Minerals site have indicated a significant number of cases of asbestos-related disease. In addition, several cases of asbestos disease have been reported in individuals who had no known asbestos exposure, but played as children in the stoner rock piles at Western Minerals. Those individuals also lived immediately across the street from the facility and could also have received exposure from airborne releases from the facility. In the interest of protecting public health, I recommend that appropriate actions be initiated to reduce or eliminate exposure to mineral fibers at the Western Minerals site and residences where the waste stoner rock material may be located.

II SUMMARY OF FINDINGS:

- I) Fibrous mineral fibers found in the vicinity of the former Western Minerals site are amphibole asbestiform in habit, are of respirable size, and are known to induce lung cancer, mesothelioma, and asbestosis upon inhalation exposure.**
- II The waste stoner rock material has been shown to be highly enriched for asbestos content. Locations where the waste stoner rock has been distributed are source areas for exposure to the residents. Physical disturbance of the material (e.g., driving a vehicle on a contaminated driveway surface, mowing a lawn containing this material, leaf collection activities by rake or leafblower on contaminated lawns, or wind action) can result into dispersion of asbestos fibers into the air.**
- II Amphibole material, apparently originating from contaminated driveways, has been observed to be distributed on adjacent surfaces, including alleys and residential streets. This dispersion into areas with higher traffic magnifies the potential for breaking the material into smaller and smaller sizes that would be more likely to become airborne and respirable. These are areas where there may also be a greater likelihood of human contact with the asbestos material.**
- II The contaminated soil and surfaces present an ongoing source of asbestos which can become entrained in air and can be transported on vehicles, pets, and shoes to homes and other areas of potential secondary human exposure.**

III BACKGROUND:

Vermiculite ore bodies on Zonolite mountain are associated with tremolite ranging in concentration to nearly 100% in selected areas (W.R. Grace). Although early exploration and mining efforts by the Zonolite Company focused upon the commercial viability of fibrous amphibole deposits found on Zonolite Mountain (DOI, 1928) no commercial production of tremolite is reported. Vermiculite was discovered in the Rainy Creek Mining District of Lincoln County, Montana in 1916 by E.N. Alley. Alley formed the Zonolite Company and began commercial production of vermiculite in 1921. Another company, the Vermiculite and Asbestos Company (later known as the Universal Insulation Company), operated on the same deposits (BOM, 1953). W.R. Grace purchased the mining operations in 1963 and greatly increased production of vermiculite until 1990 when mining and milling of vermiculite ceased. During early mining operations airborne fiber concentrations at the mine exceeded 100 fibers/cc in several job classifications (Amandus et al, 1987a). Airborne fiber concentrations in the residential area of Libby exceeded the present occupational Permissible Exposure Level (PEL) of 0.1 fiber/cubic centimeter established by OSHA 1994 (MRI, 1982; Eschenbach deposition). This exposure limit is considered to be associated with significant risk (3.4 additional asbestos-related cancers per 1000 individuals as per OSHA estimates) but is the practical lower limit of detection using phase contrast microscopy (PCM) as a measurement technique (OSHA, 1994).

Amphibole mineral fibers, including tremolite, are known to cause a variety of lethal and sub-lethal health effects as discussed below. Evidence of the lethal effects of exposure to tremolite from the vermiculite ore body on Zonolite Mountain is abundant. During the 1980s Lockey et al. (1984) and then the National Institutes for Occupational Safety and Health (NIOSH) (Amandus et al., 1987) conducted investigations of tremolite exposure and the morbidity and mortality of workers in various aspects of the mining, milling and refining process. These investigations, conducted during active vermiculite mining and processing activities in Libby, MT demonstrated multiple cases of lung cancer, mesothelioma, and asbestosis in workers exposed to variable concentrations of tremolite fiber at the mine. These findings were independently confirmed by concurrent investigations conducted by MacDonald et al., (1986).

Since the cessation of vermiculite mining and processing operations in Libby, local physicians and nearby pulmonary specialists have continued to identify individuals suffering from asbestosis, lung cancer and mesothelioma as a result of exposure to tremolite mineral fibers. One pulmonologist has seen more than 250 cases of asbestos-related disease from the Libby area (Whitehouse, 2000). While 142 of these individuals are believed to have been occupationally exposed during vermiculite mining operations, 29 individuals were secondarily exposed through household contact. Eleven cases are reported to have no connection with former mining or processing activities. These estimates are derived from a single physician working in the vicinity of Libby. Actual numbers of affected individuals are unknown and may be considerably higher.

IV ENDANGERMENT RATIONALE:

The rationale for determination of an imminent and substantial endangerment from exposures at the former Western Minerals site is:

- 1) Epidemiological studies workers from the Libby vermiculite mine have demonstrated that exposure to the amphibole asbestos fibers in this vermiculite ore and processing by-products of the vermiculite ore are associated with a variety of lethal and sub lethal health effects in former workers, families of workers, and in non-occupationally exposed members of the Libby community. In addition, a significant number of former workers at the Western Minerals vermiculite exfoliation facility have developed asbestos-related disease. Also, several individuals with only childhood exposure to the waste stoner rock material at Western Minerals have developed asbestos-related disease, with at least one death.
- 2) Detection of high levels of amphibole asbestos concentration (up to 20%) in samples taken in surface and subsurface soils at the site. These fibers represent a significant source of exposure to current workers and to nearby residents as a result of air dispersion of fibers. The highest levels were detected in areas immediately across the street from residences.
- 3) Detection of high levels of amphibole asbestos concentration (up to 80%) in surface soil and dust samples taken in residential yards, driveways, alleys, and streets within one block of the facility. Complete human exposure pathways (by inhalation and ingestion) have been positively identified by personal observation and empirical measurement;
- 4) The presence of amphibole asbestos material containing fibers of respirable and carcinogenic dimensions represents a significant health threat for human exposure.

A. Health Effects of Tremolite Asbestos: *Hazard Assessment*

Fibrous minerals found in association with the Libby vermiculite are members of a solid solution series of hydrated magnesium silicates in which varying amounts of iron (Fe^{++}), sodium (Na^+), and aluminum (Al^{3+}) can substitute for calcium and magnesium in the solid solution. The solid solution series includes tremolite $[\text{Ca}_2\text{Mg}_5(\text{Si}_8\text{O}_{22})(\text{OH})_2]$, actinolite $[\text{Ca}_2(\text{Fe}^{2+}, \text{Mg})_5(\text{Si}_8\text{O}_{22})(\text{OH})_2]$, richterite $[\text{Na}(\text{CaNa})(\text{Mg}, \text{Fe}^{2+})_5(\text{Si}_8\text{O}_{22})(\text{OH})_2]$, and winchite $[\text{NaCa}(\text{Mg}, \text{Fe}^{++})_4\text{AlSi}_8\text{O}_{22}(\text{OH})_2]$. Collectively with other minerals such as anthophyllite and amosite, these materials are referred to as amphiboles. In their fibrous habit, as identified in the ore body on Zonolite mountain, in association with un-expanded vermiculite, and in the exfoliated or expanded vermiculite product, these materials are generally referred to as asbestos

(Eschenbach, 1983) and are capable of causing significant human morbidity and mortality upon inhalation.

Health effect associated with fiber exposure from the Libby facilities is documented in a variety of technical reports (EPA 1980; EPA 1985; EPA 1986), and peer-reviewed studies. Lockey et al. (1984) demonstrated pleural radiographic changes and pleuritic chest symptoms in occupationally exposed workers with exposure to tremolite fiber from Libby. A detailed study of occupational exposure to tremolite during vermiculite ore processing documented significant increases of non-malignant respiratory disease and lung cancer in workers (Amandus et al., 1987a; Amandus and Wheeler, 1987). In a study conducted concurrently with the NIOSH investigation, McDonald et al. (1986) determined independently that workers in the mine experienced a "serious hazard from lung cancer, pneumoconiosis, and mesothelioma" as a result of exposure to tremolite fibers associated with the vermiculite processing.

In addition to effects associated with inhalation exposure to mineral fibers several studies indicate elevated risk of gastrointestinal cancer following exposure (Seidman et al., 1986; Ehrlich et al., 1991; Gerhardsson de Verdier et al., 1992).

B. Identification of Tremolite fibers at the Western Minerals site and Surrounding Residential Area: *Exposure Assessment*

Surface soil samples were analyzed by Polarized Light Microscopy (PLM), followed by Transmission Electron Microscopy (TEM) and Energy Dispersive X-Ray Spectrometry (EDX). Analysis of the samples by Analytical results indicated a significant percentage of samples with detectable tremolite-actinolite asbestos (Table 1).

Table 1: Summary of soil samples from Western Minerals and surrounding residential area

Location	# samples taken	#samples with detectable asbestos	% asbestos	asbestos type
Industrial property	23	16 samples: >1% 5 samples: trace	1-20%	tremolite-actinolite
Residential properties	9	7 samples: >1% 2 samples: trace	6-80%	tremolite-actinolite

TEM/EDX revealed abundant amphibole fibers of the tremolite-actinolite solution series.

Elemental analysis of the fibers showed the presence of a sodium peak, consistent with the mineral Richerite that is found in the Libby vermiculite ore. Fiber dimensions (length and width) have been shown to have an important impact on fiber toxicity (Berman et al., 1995; Blake et al., 1998; Castranova, 1998; Jianping, 1999). Clearance of fibers from the lung is inhibited and fiber toxicity is significantly enhanced when fiber length is greater than approximately 8µm (Blake et al., 1998). Analysis of fiber dimensions from these samples have indicated a significant proportion of fibers greater than 5 µm in length and aspect ratios (length to width) of 10-20:1.

The collection of residential samples focused on areas where the waste stoner rock was distributed for a variety of purposes. Analysis of this material indicates that it is highly enriched for amphibole asbestos, compared to vermiculite ore or the finished vermiculite insulation product. These samples were taken from areas such as yards, driveways, and alleys where there would be frequent human exposure. It would be expected that children would have an even greater exposure due to the nature of their recreational activities. Children are especially susceptible to mesothelioma due to their longer life expectancy relative to the latency of the disease (EPA, 1986).

The route of exposure that represents the greatest health concern is the inhalation of airborne fibers, dispersed from soil or concrete surfaces by the action of pedestrian or vehicular traffic, or by wind dispersion. Several measurements have been made to estimate air concentrations resulting from the handling of asbestos-contaminated soils and bulk materials, and may serve as a basis for estimating the potential air dispersion of asbestos fibers in the stoner rock in residential areas. Addison et al., (1988) generated airborne dust clouds from mixtures of soil containing asbestos concentrations from 1 to 0.001% by weight. Dust concentrations were maintained at 5 mg/M³ for 4 hours prior to measurement of airborne asbestos. The results indicated that, even the lowest soil asbestos concentrations (0.001%) were able to produce airborne asbestos concentrations which greatly exceed recommended human exposure limits. A similar investigation conducted by EPA (1994) indicated the likelihood of elevated airborne asbestos concentrations as a result of vehicular traffic along roadways constructed of serpentine rock. Though more realistic than the Addison study in terms of human exposure, the results of the EPA investigation also indicated significant risks associated with vehicle traffic along roadways containing 0.006 weight percent asbestos by TEM analysis.

In addition to the dispersion of fibers into the air, the frictional forces of foot and vehicular traffic on these surfaces would be expected to facilitate the breakdown of the amphibole asbestos bundles into smaller and more respirable fibers over time.

V CONCLUSION:

One of the main concerns about asbestos fiber exposure is that the dose is cumulative. Fibers of the dimensions identified in these samples have characteristics indicating that when inhaled they will penetrate deep into lung tissue and will persist due to their low clearance rate from the lungs. Studies have shown that tremolite asbestos is more stable than other forms of asbestos, which will further contribute to the accumulation of fibers in lung tissue. Children exposed to these fibers are of greatest risk due to the relatively long latency period for the asbestos-associated diseases, asbestosis, lung cancer and mesothelioma.

Unlike chemicals that can degrade in the environment, asbestos fibers from this material will persist and will continue to be generated due the presence of the relatively large mass of amphibole bundles. This evidence clearly indicates that the amphibole asbestos material in the residential soil at these locations is of a significant mass and fiber characteristics to pose an imminent and substantial threat to public health.

REFERENCES:

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Amandus, H.E., Althouse, R, Morgan W.K.C. Sargent, E.N. and Jones, R. (1987b) The morbidity and mortality of vermiculite miners and millers exposed to tremolite-actinolite: part III. Radiographic findings. *Am. J. Ind. Med.* 11:27-37.

Berman, DW, Crump, K.S., Chatfield, E.J., Davis, J.M.G., and Jones, A.D., (1995) The sizes, shapes, and mineralogy of asbestos structures that induce lung tumors or mesothelioma in AF/HAN rats following inhalation. *Risk Analysis* 15(2) 181-195.

Blake, T., Castranova, V., Schwegler-Berry, D., Baron, P., Deye, Changong, L., Jones, W. (1998) Effect of fiber length on glass microfiber cytotoxicity. *J. Tox. Env., Health Part A* 54:243-259

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ATTACHMENT 1

ATTACHMENT 1

U.S. ENVIRONMENTAL PROTECTION AGENCY REMOVAL ACTION

ADMINISTRATIVE RECORD FOR WESTERN MINERAL PRODUCTS SITE MINNEAPOLIS, HENNEPIN COUNTY, MINNESOTA

ORIGINAL
SEPTEMBER 12, 2000

<u>NO.</u>	<u>DATE</u>	<u>AUTHOR</u>	<u>RECIPIENT</u>	<u>TITLE/DESCRIPTION</u>	<u>PAGES</u>
1	09/11/00	Ecology and Environment, Inc.	U.S. EPA	Letter Report for the Residential Portion of the Western Mineral Products Site	118
2	09/21/00	Zintak, L., U.S. EPA	Muno, W., U.S. EPA	Action Memorandum: Request for a Time-Critical Removal Action Approval at the Western Mineral Products Site (PORTIONS OF THIS DOCUMENT HAVE BEEN REDACTED)	29

UPDATE #1
JULY 26, 2001

1	10/18/00	Zintak, L. & S. Vega, U.S. EPA	Distribution List	POLREP #1 for the Western Mineral Products Residential Sites	5
2	10/26/00	Zintak, L. & S. Vega, U.S. EPA	Distribution List	POLREP #2 for the Western Mineral Products Residential Sites	3
3	11/02/00	Zintak, L. & S. Vega, U.S. EPA	Distribution List	POLREP #3 for the Western Mineral Products Residential Sites	4
4	11/08/00	Zintak, L. & S. Vega, U.S. EPA	Distribution List	POLREP #4 for the Western Mineral Products Residential Sites	4
5	07/26/01	Vega, S., U.S. EPA	Muno, W., U.S. EPA	Amended Action Memo for Phase II of the Time-Critical Removal Action at the Western Mineral Products Site (PORTIONS OF THIS DOCUMENT HAVE BEEN REDACTED)	38

<u>NO.</u>	<u>DATE</u>	<u>AUTHOR</u>	<u>RECIPIENT</u>	<u>TITLE/DESCRIPTION</u>	<u>PAGES</u>
<u>UPDATE #2</u> SEPTEMBER 13, 2001					
1	09/13/01	Vega, S., U.S. EPA	Muno, W., U.S. EPA	Action Memorandum: Request for an Exemption from the 12-Month Statutory Limit and Request for a Ceiling Increase for Phase II of the Time-Critical Removal Action at the Western Mineral Products Site (PORTIONS OF THIS DOCUMENT HAVE BEEN REACTED)	79
<u>UPDATE #3</u> JUNE 24, 2002					
1	00/00/00	Vega, S., U.S. EPA	Muno, W., U.S. EPA	Action Memorandum: Request for a Ceiling Increase and CERCLA Removal Action Exemption to the \$2 Million Statutory Limit for the Western Mineral Products Residential Site (PENDING)	

ATTACHMENT 2



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

SEP 21 2000

REPLY TO THE ATTENTION OF: SE-5J

ACTION MEMORANDUM

SUBJECT: Request for a Time-Critical Removal Action approval at the Western Mineral Products Site in Minneapolis, Hennepin County, Minnesota (Site ID # B5P2).

FROM: Leonard N. Zintak, Jr., On-Scene Coordinator
Emergency Response Section 3

TO: William E. Muno, Director
Superfund Division

THRU: Richard C. Karl, Chief
Emergency Response Branch

I. PURPOSE

The purpose of this action memorandum is to request and document approval to expend up to \$898,200 to conduct a time-critical removal action at the Western Mineral Products Site located in Minneapolis, Hennepin County, Minnesota. Specifically, the proposed removal action will address the contaminated residential properties surrounding the industrial portion of the site.

This removal action addresses the need to mitigate the threats to the local population and the environment posed by fibrous amphibole asbestos that was released into the environment from the industrial portion of the site as a result of the processing of vermiculite ore and disposal of associated waste products. High concentrations of amphibole asbestos posing a public health threat have been detected on and in the areas surrounding the former Western Mineral Products/W.R. Grace property and on the adjacent Electramatic property. These properties are herein referred to as the industrial sites. Also, high concentrations of amphibole asbestos have been detected in the residential areas (residential sites) surrounding the industrial sites.

The proposed removal action will address immediate health threats identified in the residential areas during EPA's sampling in Northeast Minneapolis which occurred from March through



August 2000. EPA plans to conduct further sampling at the residential sites which surround the industrial site and in other areas that may have been impacted by the vermiculite processing operations at the Site. This subsequent sampling, analysis and evaluation may identify additional time-critical threats at other residential sites.

This site is not on the National Priorities List (NPL).

II. SITE CONDITIONS AND BACKGROUND

CERCLIS ID # MNN 000 508 056

A. Site Description and Background

The industrial sites are located at 1720 Madison Street N.E. and 1815 Jefferson Street N.E., Minneapolis, Hennepin County, Minnesota, and are bordered on the east by Burlington Northern Santa Fe railroad tracks, on the north by commercial buildings and west by residential properties and a city maintenance facility, and on the south by a commercial building.

The industrial sites consist of two parcels of land, one currently owned by Madison Complex, Inc. and the other currently owned by Electramatic, Inc. The site is occupied by a three-story brick office building, a brick warehouse structure, two four-story silos, and the Electramatic building to the north. The remaining portions of the industrial sites are parking lots and an abandoned section of 18th Street that divides the two parcels of land. The abandoned section of 18th Street is now owned by Electramatic and Madison Complex.

Western Mineral Products Company, a Minnesota company, operated at 1720 Madison Street N.E. as an independent company from 1946 to 1966. During part of this time it was a licensee of the Zonolite Company, a Montana Company. W.R. Grace acquired the Zonolite Company through a merger on April 16, 1963. The property at 1720 Madison was sold by W.R. Grace to Madison Complex, Inc. on October 24, 1989 by deed dated September 29, 1989. Allegedly, in 1990, W.R. Grace removed all materials that were stored in the two silos. The property at 1720 Madison is currently leased to Panel Specialties, Inc.(PSI), which manufactures prison furniture and security equipment on the property.

The Western Mineral Products Site at 1720 Madison Street N.E. processed vermiculite

ore that was shipped from the mine in Libby, Montana. The vermiculite ore body in Libby, Montana also contained amphibole asbestos fibers of the tremolite-actinolite-richterite-winchite solid solution series (herein referred to as amphibole asbestos) (Bureau of Mines Monograph, 1928). Unlike the commercially exploited chrysotile asbestos, the tremolite-actinolite material has never been used commercially on a wide scale, and for most of the mine's operating life was considered a contaminant. The commercially exploited vermiculite was used in a variety of insulation products and construction materials, as a carrier for fertilizer and other agricultural chemicals, and as a soil conditioner.

At the mine in Libby, Montana, the vermiculite ore was strip mined using conventional equipment and then processed in an on-site dry mill to remove waste rock and overburden. Once beneficiated, the processed ore was trucked to a screening plant, which separated the milled ore into five size ranges for use in various products. From there, the material was shipped across the country, predominantly by rail, for either direct inclusion in products, or for expansion (also known as exfoliation) prior to use in products.

The Western Mineral Products site in Minneapolis, Minnesota received Libby ore by rail. Expansion of the raw ore occurred inside the building at 1720 Madison Street. Expansion was accomplished by heating the ore, usually in a dry kiln, to approximately 2000 °F, which boiled the water trapped in the crystalline matrix of the vermiculite, thus expanding the material by a factor of 10 to 15 fold. The waste product from the expansion process contained high concentrations of amphibole asbestos. This waste product, also known as "Stoner Rock", was placed outside the building in a pile and was labeled as "Free Crushed Rock". The residents in the neighborhood were encouraged to take the waste material to use as fill on their properties. Residents hauled the "Free Crushed Rock" to their homes in their pickup trucks and cars. Allegedly the asbestos contaminated material was placed in yards, gardens, sandboxes, and barbeque grills. This practice may have occurred for more than 40 years.

B. Removal Site Assessment

Between February and August 2000, the U.S. EPA Emergency Response Branch conducted site assessment activities to determine the potential health threat posed by amphibole asbestos-containing wastes which were produced at the former Western Mineral Products/W.R.Grace facility at 1720 Madison and deposited outside the plant and on residential properties in the surrounding neighborhood.

As part of a national evaluation of facilities that received vermiculite ore from the Libby,

Montana mine, the U.S. Environmental Protection Agency (EPA) Region 5 Emergency Response Branch conducted an initial site visit on February 2, 2000. The initial investigation consisted of a **brief inspection** and sampling of the former processing building and property, and interviews with State and local officials and some members businesses operating in the area.

During the investigation EPA observed exfoliated vermiculite insulation inside the building in a ceiling area on the first floor. Also, there was visible vermiculite in the surface soils around the building. Samples were collected from these areas and were analyzed using polarized light microscopy (PLM) and transmission electron microscopy (TEM). These samples indicated trace amounts of asbestos at concentrations less than 1% by visual estimate. On April 13, 2000, U.S. EPA returned to the site to perform additional of the surface soil and indoor insulation. While the indoor samples did not detect any asbestos, the three soil samples indicated levels between 2 % and 20 % asbestos. This finding triggered additional investigatory work and also a public meeting at the nearby armory in Northeast Minneapolis on April 13, 2000. At public meeting the local residents and the news media were updated on the national and local investigation of the vermiculite sites associated with the Libby, Montana mine. At the public meeting many residents expressed their concern with the adverse health effects associated with the Western Mineral Products site. Many of the former workers from the Site have contracted asbestosis or mesothelioma, both asbestos-related diseases.

These findings led EPA to initiate a residential property investigation with the following goals:





1. Visually identify asbestos contamination in alleys and yards;
2. Sample and analyze residential areas for asbestos;
3. Conduct door-to-door community outreach to determine the extent of contamination in the residential areas around the site.

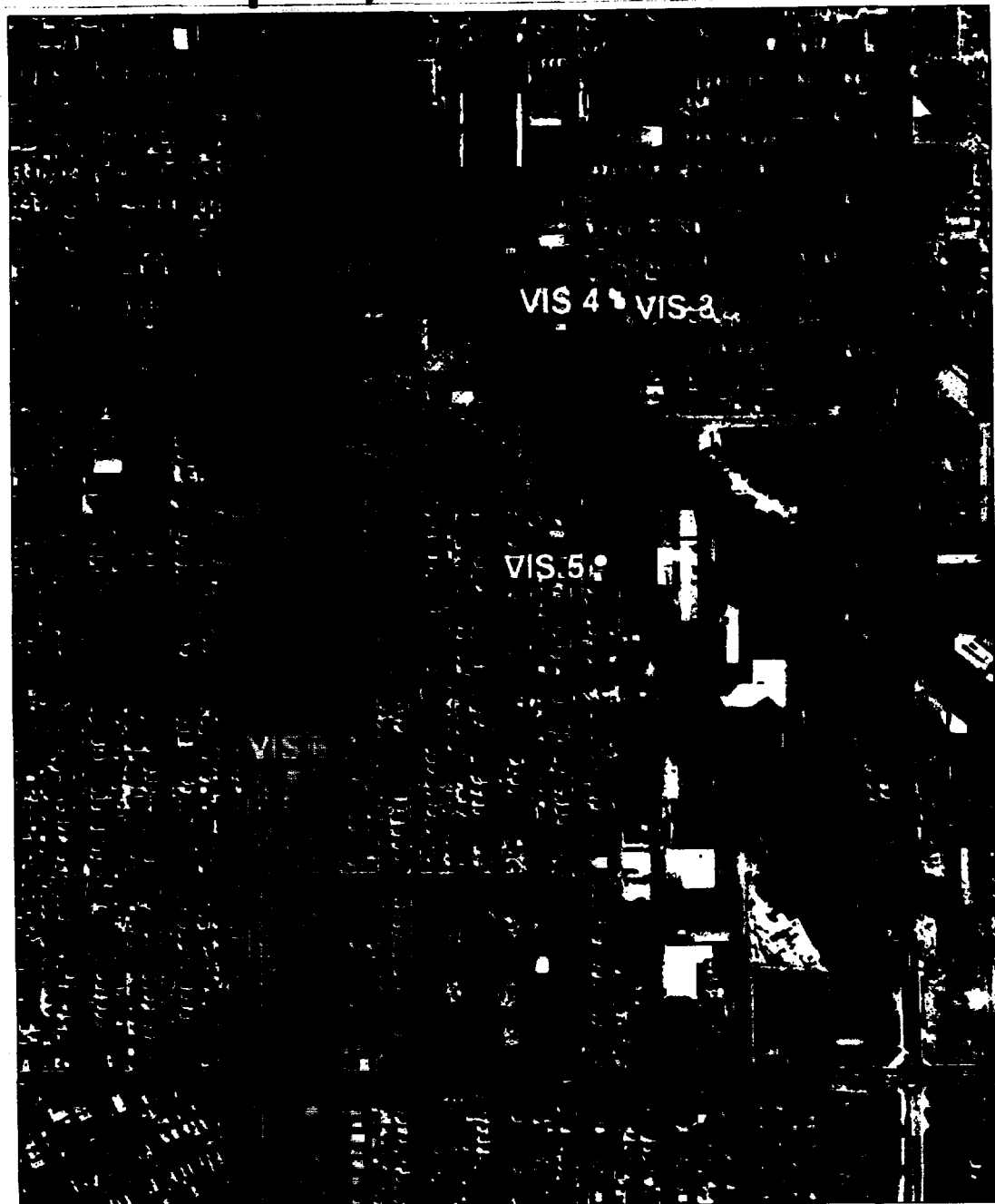
In June and July 2000, the EPA collected soil samples from alleys in the residential areas as part of the residential investigation and extent of contamination study (See Figure 1). Visible amphibole asbestos was observed and confirmed through laboratory analysis in the alleys and adjacent yards. Concentrations of asbestos as high as 95% were confirmed in samples taken from the concrete surface of the alleys. Because the Stoner Rock waste material was made readily available to the general public, EPA expects that other contaminated residences will be identified.

It has been the experience of EPA Region 8 that laboratories that were contracted to perform this analysis reported some difficulty in reading the samples due to the matrix and

**Vicinity of 1720 Madison Street NE
Minneapolis, Minnesota**

Legend

-  Grab Samples
August 1-2, 2000
-  Grab Samples
June 20-22, 2000
-  Visually Inspected
August 1-2, 2000
-  Industrial Site



0.2 0 0.2 0.4 Miles



A horizontal scale bar with four segments, corresponding to the distances 0.2, 0, 0.2, and 0.4 miles.



**Preliminary Map
Coordinate System
UTM Zone 15, NAD 83**

**Sample Locations for August 1-2, 2000
supported by GPS Locational Data**

the long thin nature of the amphibole asbestos. As a result labs indicated that they were likely under reporting asbestos concentrations.

Asbestos is a hazardous substance as defined by 40 CFR Section 302.4 of the National Contingency Plan (NCP). Asbestos is of potential concern because chronic inhalation exposure to excessive levels of asbestos fibers suspended in air can result in lung disease such as asbestosis, mesothelioma, and lung cancer. Subacute exposures as short as a few days have been shown to cause mesothelioma. Exposures via ingestion and dermal contact are considered to be of lesser concern. Characteristics of amphibole asbestos that are of concern are in the range of greater than 5 microns in length and have an aspect ratio of greater than 5 to 1.

C. Community characteristics

The Environmental Justice (EJ) Analysis indicated that the site is located in census tract 0025, block group 1, with a population of 376. To meet the EJ concern criteria, the area within 1-mile of the site must have a population that is twice the state low income percentage and/or twice the state minority percentage. For this site, the area must be at least 54% low-income and/or at least 12% minority. At this site, the low-income percentage is 55.1%, and the minority percentage is 19.7%. Therefore this site does meet the region's EJ criteria based on demographics as identified in "Region 5 Interim Guidelines for Identifying and Addressing a Potential EJ Case, June 1998".

III. THREATS TO PUBLIC HEALTH OR WELFARE OR THE ENVIRONMENT, AND STATUTORY AND REGULATORY AUTHORITIES

A. Threats to Public Health or Welfare

The threat of exposure to residents exists through direct contact and subsequent inhalation of amphibole asbestos which is currently in the alley's and yards of residential properties around the Site. The conditions at the Site present an imminent and substantial threat to human health and the environment and meet the criteria for initiating a Removal Action under Section 300.415(b)(2) of the NCP. The following factors from §300.415(b)(2) of the NCP form the basis for EPA's determination of the threat presented, and the appropriate action to be taken:

- (i) Actual or potential exposure to nearby human populations, animals, or the food chain from hazardous substances: The large concentrations of asbestos found in the residential alley's and in surface soils in yards indicate that the human exposure

pathway exists. In evaluating the threat posed by this exposure there are several factors to consider. The first is a historic review of the effects that have been documented by exposures to similar conditions. The second is construction of an appropriate conceptual risk model to quantitatively estimate current risks.

Given the occurrences of documented cases of asbestos related disease and death associated with handling of the ore, vermiculite product, and wastes from the Western Mineral site, it is reasonable to conclude that this known exposure pathway is an imminent and substantial threat to public health and welfare. In support of this conclusion the OSC sought and received concurrent opinions from the EPA Regional Toxicologist (see Attachment 3).

(iv) High levels of hazardous substances in soils largely at or near the surface, that may migrate; Vermiculite and pieces of amphibole asbestos are visible at the surface at both the industrial site and residential sites. Surface soils at both the industrial and residential sites contain high measured asbestos levels scattered widely over the surface of the properties. There are several pathways by which these asbestos fibers can become entrained in air leading to inhalation exposures. Contaminated soils can easily be tracked into buildings or off the contaminated properties by truck, automobile, bicycle, and/or pedestrian traffic; and then through normal activities, such as vacuuming or other air disturbance, become respirable dust. Wind, particularly in dry summer months, can lead to the migration of fine asbestos fibers from contaminated surface soils. Rainfall and snow melt would also tend to wash the fibers off of the residential yards onto the adjacent alley's and to the nearby streets and sewers where they could also become airborne.

There is documentation that in the past, area residents would remove bulk waste vermiculite that had been abandoned by Grace at the industrial site to use as fill around their homes. This has resulted in the contamination of yards, driveways, and gardens with amphibole asbestos in the area around the site and possibly on residential sites in the suburbs surrounding Minneapolis. Residents and newspaper reports indicate that from the 1940's through the 1980's children in the neighborhood played in the large pile of waste vermiculite that was labeled "Free Crushed Rock" by W.R.Grace.

Currently EPA has not established, under any of its regulatory programs, an asbestos level in soil below which an exposure does not pose a risk. The 1% cut-off level for regulation under the Toxic Substances Control Act abatement program was established on the basis of analytical capability at the time, and was not established based on the level of risk represented. To the contrary, at Superfund

sites in California EPA Region IX found in certain settings that concentrations of asbestos less than 1% posed unacceptable inhalation risks when subject to disturbance by traffic (EPA, 1994).

(v) Weather conditions that may cause hazardous substances or pollutants or contaminants to migrate or be released; The warmer temperatures and dry weather typical in the summer and fall months in Minneapolis will contribute to the migration of asbestos containing soils. As soils dry out they are more likely to be transported by wind, causing the asbestos to become airborne and available for inhalation. In the spring time snow melt, rainfall, or other forms of run-off inducing events will tend to spread the contamination further from the yards to the alley's to the streets.

(vii) The (lack of) availability of other appropriate federal or state mechanisms to respond to the release; No other Local, State, or Federal agency is in the position or currently has the resources to independently implement an effective response action to address the on-going threats presented at the residential sites. EPA will conduct its actions in cooperation with State and local authorities. The Minnesota Pollution Control Agency (MPCA) is the lead oversight agency for the cleanup of the industrial site under their voluntary cleanup program.

B. Threats to the Environment

The Site investigation has not proceeded far enough to know if the asbestos contamination is a threat to animals, water, and other parts of the environment. Asbestos is primarily a threat to human health.

IV. ENDANGERMENT DETERMINATION

Asbestos is a generic term for a group of six naturally-occurring fibrous silicate minerals. The predominant fibrous nature of minerals found at the Western Mineral Products Site are of the tremolite-actinolite solid solution series (referred to in this Action Memo as amphibole asbestos). Asbestos can cause asbestosis and is a recognized human carcinogen, causing lung cancer and mesothelioma, a lethal neoplasm of the lining of the chest and abdominal cavities. All of these asbestos related diseases have been found, to an unprecedented extent among former plant workers, their families, and to nearby residents with no known occupational or family connection to the vermiculite processing operations in Minneapolis. Cancer of the larynx and esophageal lining has also been associated with exposure to asbestos. Commercial forms of asbestos have been found to be carcinogenic in experimental animals.

Actual or threatened releases of asbestos from this Site, if not addressed by implementing the response action selected in this Action Memorandum, present an imminent and substantial endangerment to public health, welfare, and the environment.

V. PROPOSED ACTIONS AND ESTIMATED COSTS

A. Proposed Actions

To mitigate the threat to the public health and welfare or the environment posed by the asbestos present on the residential properties, the proposed removal actions are outlined below. The removal will involve the following:

- a. Develop and implement a site health and safety plan;
- b. Determine the horizontal extent of asbestos contamination in the contaminated residential sites and identify areas to be remediated;
- c. Excavate and remove asbestos contaminated soils to a maximum depth of 18 inches in the yards and alley's;
- d. Dispose of contaminated soils at an EPA-approved off-site disposal facility;
- e. Remove and dispose of asbestos from the surface of the paved alley's and driveways;
- f. Perform personal air sampling and ambient air sampling during remediation activities;
- g. Implement engineering measures to control dust during the cleanup;
- h. Install a synthetic liner at the bottom of the excavated area prior to backfill;
- i. Analyze bulk asbestos samples using standard Polarized Light Microscopy (PLM) methods. Supplement PLM analysis with Transmission Electron Microscopy (TEM) for samples with lower concentrations of asbestos to assess whether contamination is present and whether sufficient excavation has occurred;
- j. Backfill excavated areas with clean soil and restore property to original pre-removal condition;

It is estimated that each residential property will take approximately an average of 1.5 days of on-site work time to remediate. This project is estimated to take 40 days to complete assuming that 30 residential properties require remediation.

For the purposes of this initial removal action, cleanups will be initiated at properties with asbestos contamination levels of 1% or greater. Surface soils with detectable levels of contamination will be removed. The excavation depth will be approximately 18 inches.

In accordance with Section 300.415(l), EPA will pursue appropriate arrangements for

post-removal site controls at the disposal site to ensure the long-term integrity of the removal. EPA has not yet made a decision regarding NPL listing for the Site. The proposed removal actions should compliment and contribute to the overall success of any remedial actions in the future.

As this cleanup is being conducted as a Time-Critical Removal Action, all Federal and State ARARs may not have been identified at this time. In accordance with the NCP, all ARARs for the Site will be attained to the extent practicable, given the scope of the project and the urgency of the situation as they are identified.

Many of the ARARS identified for these Removal Actions come from the Clean Air Act National Emission Standards for Hazardous Pollutants (NESHAPS) for asbestos. These regulations were designed specifically for renovation and demolition of buildings with asbestos containing material (ACM) such as floor tile, ceiling tile and pipe wrapping. The regulations were not designed for piles of unexpanded vermiculite, contaminated soils, or heavily contaminated dust. As such, it is anticipated that it may not be practicable to achieve all ARARS during this Removal Action.

B. Estimated Costs

The following cost estimates include costs associated with the residential removal actions for purposes of creating a total project ceiling. These costs are being estimated anticipating that the project will need to be performed as a fund lead action. The costs do not include any past or future investigation costs on the Site. Costs are projected as follows:

EXTRAMURAL COSTS

Cleanup Contractor Costs	\$ 645,000
Contingency (15%)	\$ 96,750
Subtotal	\$ 741,750
START	\$ 30,250
Extramural Subtotal	\$ 772,000
Extramural Contingency (10%)	\$ 77,200
TOTAL, EXTRAMURAL COSTS	\$ 849,200

INTRAMURAL COSTS

U.S. EPA Direct Costs
\$30 x (500 Regional Hours + 50 H.Q. hours) \$ 16,500

U.S. EPA Indirect Costs
\$65 x 500 Regional Hours \$ 32,500

TOTAL INTRAMURAL COSTS \$ 49,000

TOTAL PROJECT CEILING \$ 898,200

A detailed cleanup contractor cost breakdown is available as Attachment 1.

VI. EXPECTED CHANGE IN THE SITUATION SHOULD ACTION BE DELAYED OR NOT TAKEN

Delayed action will increase public health risks to the local population/environment posed by asbestos fibers in the residential alleys and yards.

VII. OUTSTANDING POLICY ISSUES

Asbestos removals have been completed in Region 5, and around the country at numerous removal sites which were initiated under Section 300.415 of the NCP and in compliance with NESHAPS regulation under 40 CFR Section 61.150. This removal does not set a precedent or constitute a nationally significant issue. Because of the potentially broad impact of the vermiculite ore with high levels of amphibole asbestos mined from the Libby, Montana deposits, EPA Region 5 is coordinating with EPA Headquarters and other regions to assure a consistent approach to vermiculite issues.

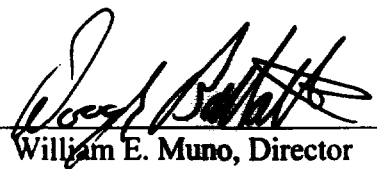
VIII. ENFORCEMENT

For administrative purposes, information concerning the enforcement strategy for this Site is contained in the attached Enforcement Confidential Addendum.

IX. RECOMMENDATION

This decision document represents the selected initial Removal Action for the residential portion of the Western Mineral Products Site, located in Minneapolis, Hennepin County, Minnesota, developed in accordance with CERCLA as amended, and not inconsistent with the NCP. This decision is based on the Administrative Record for the Site. Conditions at the Site meet the NCP §300.415(b)(2) criteria for a Removal Action, and your approval is recommend. The total project ceiling, if approved, will be \$ 898,200. Of this, \$ 818,950 may be used for cleanup contractor costs. You may indicate your decision by signing below.

APPROVE: _____

for 
William E. Muno, Director
Superfund Division

Date: _____

7/21/00

DISAPPROVE: _____

William E. Muno, Director
Superfund Division

Date: _____

Attachments:

- Figure 1 - Site and Residential Sample Location Map
- Attachment 1 - Cleanup Contractor Costs
- Attachment 2 - Administrative Record Index
- Attachment 3 - EPA Toxicologist's Memorandum
- Attachment 4 - Confidential Enforcement Attachment
- Attachment 5 - Environmental Justice Analysis

cc: K. Mould, U.S. EPA HQ, 203G
D. Henne, U.S. Department of Interior, **w/o Enforcement Addendum**
J. Connell, Minnesota Pollution Control Agency, **w/o Enforcement Addendum**

Peder Larson, w/o Enforcement Addendum
Commissioner's Office
Minnesota Pollution Control Agency
520 Lafayette
St. Paul, MN 55155-4194

Rita Messing, Ph.D., w/o Enforcement Addendum
Minnesota Department of Health
121 E. 7th Place
St. Paul, MN 55101

Rodney Sando, w/o Enforcement Addendum
Commissioner's Office
500 Lafayette
St. Paul, MN 55155-4037

ATTACHMENT 4

ENFORCEMENT CONFIDENTIAL ADDENDUM

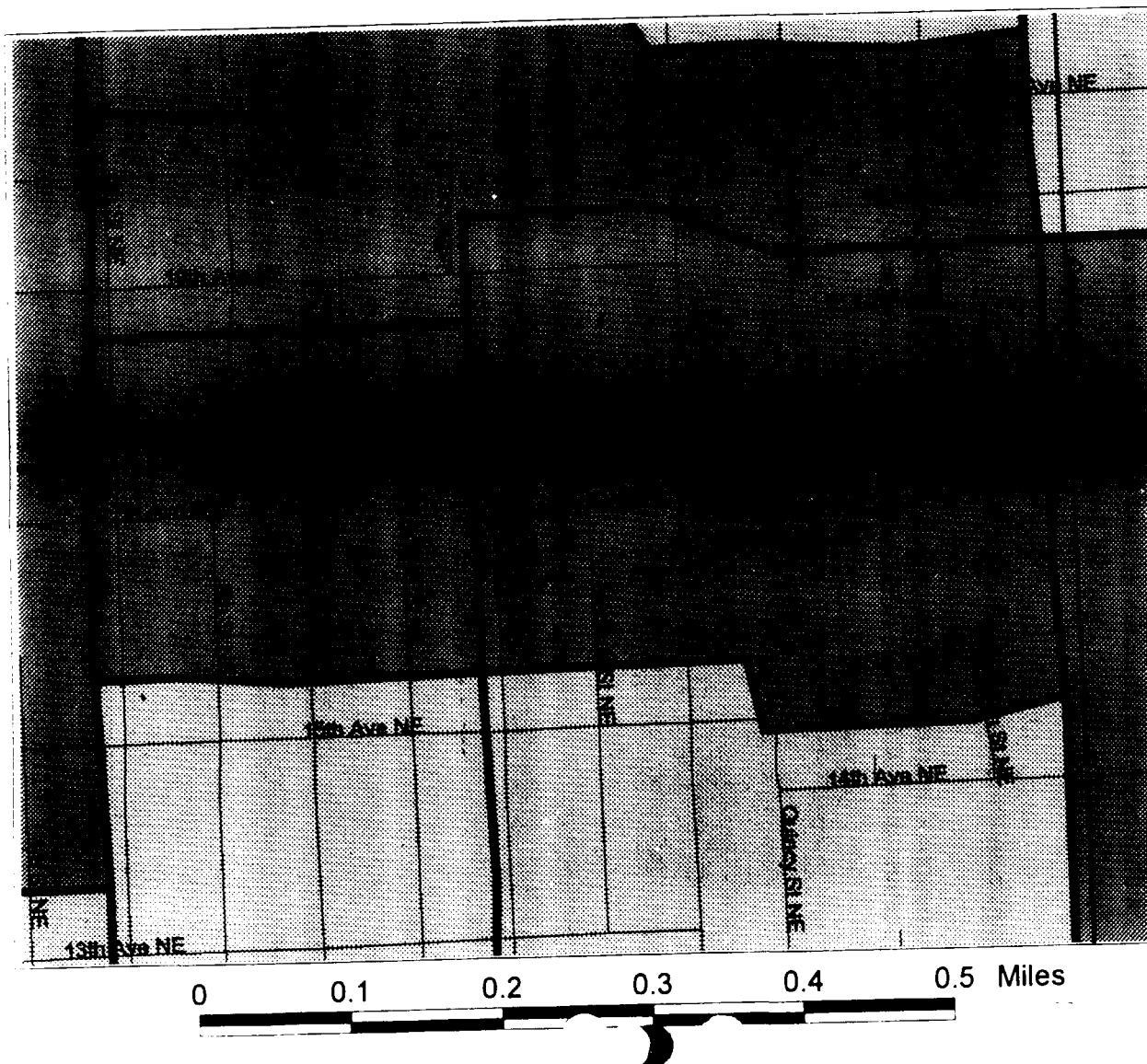
REDACTED

(2 PAGES)

NOT RELEVANT TO THE SELECTION OF THE REMOVAL ACTION

Region 5 Superfund EJ Analysis

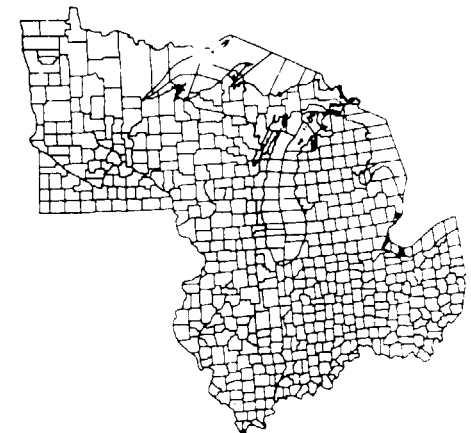
Western Mineral Products Site Minneapolis, MN



EJ Identification

- Low Income and Minority Less than State Average
- Low Income or Minority at or Greater than State Average
- Low Income or Minority 2 Times or Greater than State Average
[meets Region 5 EJ Case criteria]
- Site Location
- Block Group Boundary

Region 5 EJ Case Criteria for Minnesota
Minority: 12% or greater
Low Income: 54% or greater



U.S. EPA Region 5
Superfund GIS



Date of Map 08/24/00

Source of Map 1990 Census Database

FROM

(TUE) 10:17:30 C-20 ST: 0126 NO: 4260906260 P 2



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

OFFICE OF
SOLID WASTE AND EMERGENCY
RESPONSE

September 26, 2000

MEMORANDUM

SUBJECT: Request for Concurrence in a Time-Critical Removal
Action at the Western Mineral Products Site in
Minneapolis, Hennepin County, Minnesota
(Site ID # B5P2)

FROM: Larry G. Reed, Acting Director
Office of Emergency and Remedial Response

Paul F. Haden
(s-)

TO: Timothy Fields, Jr.
Assistant Administrator

We recently received the attached Action Memo from Region 5 for the Western Minerals Products site. The Action Memo describes the extent of contamination and potential for exposure, the establishment of a hazard for asbestos, and the planned actions. This site received vermiculite ore that was shipped from the mine in Libby, Montana. Given the association with the vermiculite ore from Libby, Montana, there has been extensive coordination between OERR and the Region on this site. Our review indicates that the action taken is consistent with other asbestos cleanups. I recommend you concur in Region 5's request.

Attachment

Concur:

Timothy Fields, Jr.

Date:

10/10/00

Non-Concur:

Date:

cc: Rick Karl, EPA Region 5

ATTACHMENT 3



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

**REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590**

JUL 27 2001

REPLY TO THE ATTENTION OF: SE-5J

AMENDED ACTION MEMORANDUM

DATE:

SUBJECT: Amended Action Memo for Phase II of the Time-Critical Removal Action at the Western Mineral Products Site in Minneapolis, Hennepin County, Minnesota (Site ID # B5P2).

FROM: Sonia R. Vega, On-Scene Coordinator
Emergency Response Section 3

TO: William E. Muno, Director
Superfund Division

THRU: Richard C. Karl, Chief
Emergency Response Branch

R. Karl for

I. PURPOSE

The purpose of this Memorandum is to request and document approval to conduct Phase II of the time-critical removal action at the residential component of Western Mineral Products Site (the Site), located in Minneapolis, Hennepin County, Minnesota. The initial action memorandum dated September 21, 2000, copy enclosed, committed \$898,200 of which up to \$410,000 were expended during Phase I of the clean up.

II. SITE CONDITIONS AND BACKGROUND

CERCLIS ID # MNN 000 508 056

A. Site Description and Background

Refer to the initial Action Memorandum dated September 21, 2000, attached.



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B. Actions to Date and Current Situation

As authorized by the Action Memorandum dated September 21, 2000, as of November 10, 2000, US EPA completed the following:

1. Development and implementation of a site specific health and safety plan;
2. Conducted outreach activities including a house-to-house survey and inspection within approximately a 1/4 mile radius from the industrial plant;
3. Established a hotline, and conducted community public meetings for citizen to report possible asbestos contamination;
4. Conducted visual inspection at 323 residential properties for the presence of vermiculite processing waste products;
5. Vacuumed asbestos contaminated materials from 16 alleys/driveways;
6. Excavated asbestos contamination at, and fully restored 9 residential properties;
7. Excavated asbestos contamination at 12 additional homes that might required further excavation/restoration during Phase II. Areas excavated at these properties were completely restored;
8. Identified another 21 properties requiring clean up work. These properties were not addressed during Phase I due to inclement weather conditions;
9. Identified 5 residential properties that require further evaluation, sampling, to determine the presence of asbestos contamination.

C. Phase II

During Phase II, U.S. EPA will continue to mitigate the threat to public health and the environment posed by the presence of asbestos contamination on residential properties surrounding the Western Minerals plant. US E.P.A. will continue the removal action addressed on the September 21, 2000 Action Memorandum, and all the necessary ancillary and supporting activities.

In addition, a more aggressive public outreach is planned as part of Phase II activities in order to identify any other residential properties containing asbestos contamination.

III. THREATS TO PUBLIC HEALTH OR WELFARE OR THE ENVIRONMENT, AND STATUTORY AND REGULATORY AUTHORITIES

Threats do not differ from those discussed in the original Action Memorandum dated September 21, 2000, attached.

IV. ENDANGERMENT DETERMINATION

Actual or threatened releases of asbestos fibers due to the presence of asbestos containing materials at the residential properties, may present an imminent and substantial endangerment to public health, welfare, or the environment if not addressed by implementing the continued response actions selected in both this and the original Action Memorandum.

V. PROPOSED ACTIONS AND ESTIMATED COSTS

A. Proposed Actions

To mitigate the threat to the public health and welfare or the environment posed by the asbestos present on the residential properties, the proposed removal actions, outlined on the original action memorandum prepared for Phase I, are outlined below. The removal will involve the following:

- i. Develop and implement a site health and safety plan;
- ii. Determine the horizontal extent of asbestos contamination in the contaminated residential sites and identify areas to be remediated;
- iii. Excavate and remove asbestos contaminated soils to a maximum depth of 18 inches in the yards and alleys;
- iv. Dispose of contaminated soils at an EPA-approved off-site disposal facility;
- v. Remove and dispose of asbestos from the surface of the paved alleys and driveways;
- vi. Perform personal air sampling and ambient air sampling during remediation activities;
- vii. Implement engineering measures to control dust during the cleanup;
- viii. Install a synthetic liner at the bottom of the excavated area prior to backfill;
- ix. Analyze bulk asbestos samples using standard Polarized Light Microscopy (PLM) methods. Supplement PLM analysis with Transmission Electron Microscopy (TEM) for samples with lower concentrations of asbestos to assess whether contamination is present and whether sufficient excavation has occurred;
- x. Backfill excavated areas with clean soil and restore property to original pre-removal condition;

It is estimated that each residential property will take approximately an average of 1.5 days of on-site work time to remediate. At this point is hard to estimate the duration of

the project. In addition to the 23 residential properties addressed during Phase I, about 21 more were identified for clean up. This task is estimated to take 40 days to complete assuming that no more residential properties are identified which require remediation. Given the intense community outreach been planned for this Phase II, it is expected that more residential properties will be identified for clean up, which makes it difficult to predict, at this time, how long this phase of the project is going to take.

For the purposes of this Phase II removal actions, cleanups will take place at properties where significant visible asbestos contamination is present and those where a surface sample collected from the property indicates significant asbestos content, even if there is no visible contamination.

B. Estimated Costs

The following cost estimates include costs associated with Phase II of the residential removal actions for purposes of creating a total project ceiling. These costs are being estimated based on the costs incurred during Phase I. The costs do not include any past costs. Costs are projected as follows:

EXTRAMURAL COSTS

Cleanup Contractor Costs	\$ 242,040
Contingency (15%)	\$ 36,306
Subtotal	\$ 278,346
START	\$ 58,800
Extramural Subtotal	\$ 337,146
Extramural Contingency (10%)	\$ 33,715
TOTAL, EXTRAMURAL COSTS	\$ 370,861

INTRAMURAL COSTS

U.S. EPA Direct Costs \$30 x (850 Regional Hours + 70 H.Q. hours)	\$ 27,600
U.S. EPA Indirect Costs \$65 x 850 Regional Hours	\$ 55,250
TOTAL INTRAMURAL COSTS	\$ 82,850
 TOTAL	 \$ 453,711

A detailed cleanup contractor cost breakdown is available as Attachment 1.

VI. EXPECTED CHANGE IN THE SITUATION SHOULD ACTION BE DELAYED OR NOT TAKEN

Delayed action will increase public health risks to the local population/environment posed by asbestos fibers in the residential alleys and yards.

VII. OUTSTANDING POLICY ISSUES

Asbestos removals have been completed in Region 5, and around the country at numerous removal sites which were initiated under Section 300.415 of the NCP and in compliance with NESHAPS regulation under 40 CFR Section 61.150. This removal does not set a precedent or constitute a nationally significant issue. Because of the potentially broad impact of the vermiculite ore with high levels of amphibole asbestos mined from the Libby, Montana deposits, EPA Region 5 is coordinating with EPA Headquarters and other regions to assure a consistent approach to vermiculite issues.

VIII. ENFORCEMENT

For administrative purposes, information concerning the enforcement strategy for this Site is contained in the attached Enforcement Confidential Addendum.

IX. RECOMMENDATION

This decision document represents the Phase II Removal Action for the residential portion of the Western Mineral Products Site, located in Minneapolis, Hennepin County, Minnesota, developed in accordance with CERCLA as amended, and not inconsistent with the NCP. This decision is based on the Administrative Record for the Site. Conditions at the Site meet the NCP §300.415(b)(2) criteria for a Removal Action, and your approval is recommended. These actions under Phase II will reach total project ceiling, approved on September 21, 2000. You may indicate your decision by signing below.

APPROVE: _____

W. E. Muno
William E. Muno, Director
Superfund Division

Date: _____

7/27/01

DISAPPROVE: _____

William E. Muno, Director
Superfund Division

Date: _____

Attachments:

Attachment 1 - Action Memorandum, September 21, 2000

Attachment 2 - Cleanup Contractor Costs

cc: C. Stanton, U.S. EPA HQ, 203G
D. Henne, U.S. Department of Interior, **w/o Enforcement Addendum**
J. Connell, Minnesota Pollution Control Agency, **w/o Enforcement Addendum**
Karen Studders, **w/o Enforcement Addendum**
Commissioner's Office
Minnesota Pollution Control Agency
520 Lafayette
St. Paul, MN 55155-4194

Rita Messing, Ph.D., **w/o Enforcement Addendum**
Minnesota Department of Health
121 E. 7th Place
St. Paul, MN 55101

Rodney Sando, **w/o Enforcement Addendum**
Commissioner's Office
500 Lafayette
St. Paul, MN 55155-4037

BCC PAGE

WESTERN MINERAL PRODUCTS SITE

**HAS BEEN REDACTED
(1 PAGE)**



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 5

77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

SEP 21 2000

REPLY TO THE ATTENTION OF SE-5J

ACTION MEMORANDUM

SUBJECT: Request for a Time-Critical Removal Action approval at the Western Mineral Products Site in Minneapolis, Hennepin County, Minnesota (Site ID # B5P2).

FROM: Leonard N. Zintak, Jr., On-Scene Coordinator
Emergency Response Section 3

TO: William E. Muno, Director
Superfund Division

THRU: Richard C. Karl, Chief
Emergency Response Branch

I. PURPOSE

The purpose of this action memorandum is to request and document approval to expend up to \$898,200 to conduct a time-critical removal action at the Western Mineral Products Site located in Minneapolis, Hennepin County, Minnesota. Specifically, the proposed removal action will address the contaminated residential properties surrounding the industrial portion of the site.

This removal action addresses the need to mitigate the threats to the local population and the environment posed by fibrous amphibole asbestos that was released into the environment from the industrial portion of the site as a result of the processing of vermiculite ore and disposal of associated waste products. High concentrations of amphibole asbestos posing a public health threat have been detected on and in the areas surrounding the former Western Mineral Products/W.R. Grace property and on the adjacent Electramatic property. These properties are herein referred to as the industrial sites. Also, high concentrations of amphibole asbestos have been detected in the residential areas (residential sites) surrounding the industrial sites.

The proposed removal action will address immediate health threats identified in the residential areas during EPA's sampling in Northeast Minneapolis which occurred from March through



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August 2000. EPA plans to conduct further sampling at the residential sites which surround the industrial site and in other areas that may have been impacted by the vermiculite processing operations at the Site. This subsequent sampling, analysis and evaluation may identify additional time-critical threats at other residential sites.

This site is not on the National Priorities List (NPL).

II. SITE CONDITIONS AND BACKGROUND

CERCLIS ID # MNN 000 508 056

A. Site Description and Background

The industrial sites are located at 1720 Madison Street N.E. and 1815 Jefferson Street N.E., Minneapolis, Hennepin County, Minnesota, and are bordered on the east by Burlington Northern Santa Fe railroad tracks, on the north by commercial buildings and west by residential properties and a city maintenance facility, and on the south by a commercial building.

The industrial sites consist of two parcels of land, one currently owned by Madison Complex, Inc. and the other currently owned by Electramatic, Inc. The site is occupied by a three-story brick office building, a brick warehouse structure, two four-story silos, and the Electramatic building to the north. The remaining portions of the industrial sites are parking lots and an abandoned section of 18th Street that divides the two parcels of land. The abandoned section of 18th Street is now owned by Electramatic and Madison Complex.

Western Mineral Products Company, a Minnesota company, operated at 1720 Madison Street N.E. as an independent company from 1946 to 1966. During part of this time it was a licensee of the Zonolite Company, a Montana Company. W.R. Grace acquired the Zonolite Company through a merger on April 16, 1963. The property at 1720 Madison was sold by W.R. Grace to Madison Complex, Inc. on October 24, 1989 by deed dated September 29, 1989. Allegedly, in 1990, W.R. Grace removed all materials that were stored in the two silos. The property at 1720 Madison is currently leased to Panel Specialties, Inc.(PSI), which manufactures prison furniture and security equipment on the property.

The Western Mineral Products Site at 1720 Madison Street N.E. processed vermiculite

ore that was shipped from the mine in Libby, Montana. The vermiculite ore body in Libby, Montana also contained amphibole asbestos fibers of the tremolite-actinolite-richterite-winchite solid solution series (herein referred to as amphibole asbestos) (Bureau of Mines Monograph, 1928). Unlike the commercially exploited chrysotile asbestos, the tremolite-actinolite material has never been used commercially on a wide scale, and for most of the mine's operating life was considered a contaminant. The commercially exploited vermiculite was used in a variety of insulation products and construction materials, as a carrier for fertilizer and other agricultural chemicals, and as a soil conditioner.

At the mine in Libby, Montana, the vermiculite ore was strip mined using conventional equipment and then processed in an on-site dry mill to remove waste rock and overburden. Once beneficiated, the processed ore was trucked to a screening plant, which separated the milled ore into five size ranges for use in various products. From there, the material was shipped across the country, predominantly by rail, for either direct inclusion in products, or for expansion (also known as exfoliation) prior to use in products.

The Western Mineral Products site in Minneapolis, Minnesota received Libby ore by rail. Expansion of the raw ore occurred inside the building at 1720 Madison Street. Expansion was accomplished by heating the ore, usually in a dry kiln, to approximately 2000 °F, which boiled the water trapped in the crystalline matrix of the vermiculite, thus expanding the material by a factor of 10 to 15 fold. The waste product from the expansion process contained high concentrations of amphibole asbestos. This waste product, also known as "Stoner Rock", was placed outside the building in a pile and was labeled as "Free Crushed Rock". The residents in the neighborhood were encouraged to take the waste material to use as fill on their properties. Residents hauled the "Free Crushed Rock" to their homes in their pickup trucks and cars. Allegedly the asbestos contaminated material was placed in yards, gardens, sandboxes, and barbeque grills. This practice may have occurred for more than 40 years.

B. Removal Site Assessment

Between February and August 2000, the U.S. EPA Emergency Response Branch conducted site assessment activities to determine the potential health threat posed by amphibole asbestos-containing wastes which were produced at the former Western Mineral Products/W.R.Grace facility at 1720 Madison and deposited outside the plant and on residential properties in the surrounding neighborhood.

As part of a national evaluation of facilities that received vermiculite ore from the Libby,

Montana mine, the U.S. Environmental Protection Agency (EPA) Region 5 Emergency Response Branch conducted an initial site visit on February 2, 2000. The initial investigation consisted of a brief inspection and sampling of the former processing building and property, and interviews with State and local officials and some members businesses operating in the area.

During the investigation EPA observed exfoliated vermiculite insulation inside the building in a ceiling area on the first floor. Also, there was visible vermiculite in the surface soils around the building. Samples were collected from these areas and were analyzed using polarized light microscopy (PLM) and transmission electron microscopy (TEM). These samples indicated trace amounts of asbestos at concentrations less than 1% by visual estimate. On April 13, 2000, U.S. EPA returned to the site to perform additional of the surface soil and indoor insulation. While the indoor samples did not detect any asbestos, the three soil samples indicated levels between 2 % and 20 % asbestos. This finding triggered additional investigatory work and also a public meeting at the nearby armory in Northeast Minneapolis on April 13, 2000. At public meeting the local residents and the news media were updated on the national and local investigation of the vermiculite sites associated with the Libby, Montana mine. At the public meeting many residents expressed their concern with the adverse health effects associated with the Western Mineral Products site. Many of the former workers from the Site have contracted asbestosis or mesothelioma, both asbestos-related diseases.

These findings led EPA to initiate a residential property investigation with the following goals:

1. Visually identify asbestos contamination in alleys and yards;
2. Sample and analyze residential areas for asbestos;
3. Conduct door-to-door community outreach to determine the extent of contamination in the residential areas around the site.

In June and July 2000, the EPA collected soil samples from alleys in the residential areas as part of the residential investigation and extent of contamination study (See Figure 1). Visible amphibole asbestos was observed and confirmed through laboratory analysis in the alleys and adjacent yards. Concentrations of asbestos as high as 95% were confirmed in samples taken from the concrete surface of the alleys. Because the Stoner Rock waste material was made readily available to the general public, EPA expects that other contaminated residences will be identified.

It has been the experience of EPA Region 8 that laboratories that were contracted to perform this analysis reported some difficulty in reading the samples due to the matrix and

RES 11

RES 101

RES 5 Industrial

RES 6 Site

VIS 4

RES 113

VIS 3

VIS 5

RES 2

RES 4

RES 16

VIS 4

RES 7

RES 8

RES 15

RES 14

gas Park

☐ Grab Samples
August 1-2, 2000

☒ Grab Samples
June 20-22, 2000

☐ Visually Inspected
August 1-2, 2000

Industrial Site



0.2 0 0.2 0.4 Miles



**Preliminary Map
Coordinate System
UTM Zone 15, NAD 83**

**Sample Locations for August 1-2, 2000
supported by GPS Locational Data**



the long thin nature of the amphibole asbestos. As a result labs indicated that they were likely under reporting asbestos concentrations.

Asbestos is a hazardous substance as defined by 40 CFR Section 302.4 of the National Contingency Plan (NCP). Asbestos is of potential concern because chronic inhalation exposure to excessive levels of asbestos fibers suspended in air can result in lung disease such as asbestosis, mesothelioma, and lung cancer. Subacute exposures as short as a few days have been shown to cause mesothelioma. Exposures via ingestion and dermal contact are considered to be of lesser concern. Characteristics of amphibole asbestos that are of concern are in the range of greater than 5 microns in length and have an aspect ratio of greater than 5 to 1.

C. Community characteristics

The Environmental Justice (EJ) Analysis indicated that the site is located in census tract 0025, block group 1, with a population of 376. To meet the EJ concern criteria, the area within 1-mile of the site must have a population that is twice the state low income percentage and/or twice the state minority percentage. For this site, the area must be at least 54% low-income and/or at least 12% minority. At this site, the low-income percentage is 55.1%, and the minority percentage is 19.7%. Therefore this site does meet the region's EJ criteria based on demographics as identified in "Region 5 Interim Guidelines for Identifying and Addressing a Potential EJ Case, June 1998".

III. THREATS TO PUBLIC HEALTH OR WELFARE OR THE ENVIRONMENT, AND STATUTORY AND REGULATORY AUTHORITIES

A. Threats to Public Health or Welfare

The threat of exposure to residents exists through direct contact and subsequent inhalation of amphibole asbestos which is currently in the alley's and yards of residential properties around the Site. The conditions at the Site present an imminent and substantial threat to human health and the environment and meet the criteria for initiating a Removal Action under Section 300.415(b)(2) of the NCP. The following factors from §300.415(b)(2) of the NCP form the basis for EPA's determination of the threat presented, and the appropriate action to be taken:

- (i) Actual or potential exposure to nearby human populations, animals, or the food chain from hazardous substances: The large concentrations of asbestos found in the residential alley's and in surface soils in yards indicate that the human exposure

pathway exists. In evaluating the threat posed by this exposure there are several factors to consider. The first is a historic review of the effects that have been documented by exposures to similar conditions. The second is construction of an appropriate conceptual risk model to quantitatively estimate current risks.

Given the occurrences of documented cases of asbestos related disease and death associated with handling of the ore, vermiculite product, and wastes from the Western Mineral site, it is reasonable to conclude that this known exposure pathway is an imminent and substantial threat to public health and welfare. In support of this conclusion the OSC sought and received concurrent opinions from the EPA Regional Toxicologist (see Attachment 3).

(iv) High levels of hazardous substances in soils largely at or near the surface, that may migrate; Vermiculite and pieces of amphibole asbestos are visible at the surface at both the industrial site and residential sites. Surface soils at both the industrial and residential sites contain high measured asbestos levels scattered widely over the surface of the properties. There are several pathways by which these asbestos fibers can become entrained in air leading to inhalation exposures. Contaminated soils can easily be tracked into buildings or off the contaminated properties by truck, automobile, bicycle, and/or pedestrian traffic; and then through normal activities, such as vacuuming or other air disturbance, become respirable dust. Wind, particularly in dry summer months, can lead to the migration of fine asbestos fibers from contaminated surface soils. Rainfall and snow melt would also tend to wash the fibers off of the residential yards onto the adjacent alley's and to the nearby streets and sewers where they could also become airborne.

There is documentation that in the past, area residents would remove bulk waste vermiculite that had been abandoned by Grace at the industrial site to use as fill around their homes. This has resulted in the contamination of yards, driveways, and gardens with amphibole asbestos in the area around the site and possibly on residential sites in the suburbs surrounding Minneapolis. Residents and newspaper reports indicate that from the 1940's through the 1980's children in the neighborhood played in the large pile of waste vermiculite that was labeled "Free Crushed Rock" by W.R.Grace.

Currently EPA has not established, under any of its regulatory programs, an asbestos level in soil below which an exposure does not pose a risk. The 1% cut-off level for regulation under the Toxic Substances Control Act abatement program was established on the basis of analytical capability at the time, and was not established based on the level of risk represented. To the contrary, at Superfund

sites in California EPA Region IX found in certain settings that concentrations of asbestos less than 1% posed unacceptable inhalation risks when subject to disturbance by traffic (EPA, 1994).

(v) Weather conditions that may cause hazardous substances or pollutants or contaminants to migrate or be released; The warmer temperatures and dry weather typical in the summer and fall months in Minneapolis will contribute to the migration of asbestos containing soils. As soils dry out they are more likely to be transported by wind, causing the asbestos to become airborne and available for inhalation. In the spring time snow melt, rainfall, or other forms of run-off inducing events will tend to spread the contamination further from the yards to the alley's to the streets.

(vii) The (lack of) availability of other appropriate federal or state mechanisms to respond to the release; No other Local, State, or Federal agency is in the position or currently has the resources to independently implement an effective response action to address the on-going threats presented at the residential sites. EPA will conduct its actions in cooperation with State and local authorities. The Minnesota Pollution Control Agency (MPCA) is the lead oversight agency for the cleanup of the industrial site under their voluntary cleanup program.

B. Threats to the Environment

The Site investigation has not proceeded far enough to know if the asbestos contamination is a threat to animals, water, and other parts of the environment. Asbestos is primarily a threat to human health.

IV. ENDANGERMENT DETERMINATION

Asbestos is a generic term for a group of six naturally-occurring fibrous silicate minerals. The predominant fibrous nature of minerals found at the Western Mineral Products Site are of the tremolite-actinolite solid solution series (referred to in this Action Memo as amphibole asbestos). Asbestos can cause asbestosis and is a recognized human carcinogen, causing lung cancer and mesothelioma, a lethal neoplasm of the lining of the chest and abdominal cavities. All of these asbestos related diseases have been found, to an unprecedented extent among former plant workers, their families, and to nearby residents with no known occupational or family connection to the vermiculite processing operations in Minneapolis. Cancer of the larynx and esophageal lining has also been associated with exposure to asbestos. Commercial forms of asbestos have been found to be carcinogenic in experimental animals.

Actual or threatened releases of asbestos from this Site, if not addressed by implementing the response action selected in this Action Memorandum, present an imminent and substantial endangerment to public health, welfare, and the environment.

V. PROPOSED ACTIONS AND ESTIMATED COSTS

A. Proposed Actions

To mitigate the threat to the public health and welfare or the environment posed by the asbestos present on the residential properties, the proposed removal actions are outlined below. The removal will involve the following:

- a. Develop and implement a site health and safety plan;
- b. Determine the horizontal extent of asbestos contamination in the contaminated residential sites and identify areas to be remediated;
- c. Excavate and remove asbestos contaminated soils to a maximum depth of 18 inches in the yards and alley's;
- d. Dispose of contaminated soils at an EPA-approved off-site disposal facility;
- e. Remove and dispose of asbestos from the surface of the paved alley's and driveways;
- f. Perform personal air sampling and ambient air sampling during remediation activities;
- g. Implement engineering measures to control dust during the cleanup;
- h. Install a synthetic liner at the bottom of the excavated area prior to backfill;
- i. Analyze bulk asbestos samples using standard Polarized Light Microscopy (PLM) methods. Supplement PLM analysis with Transmission Electron Microscopy (TEM) for samples with lower concentrations of asbestos to assess whether contamination is present and whether sufficient excavation has occurred;
- j. Backfill excavated areas with clean soil and restore property to original pre-removal condition;

It is estimated that each residential property will take approximately an average of 1.5 days of on-site work time to remediate. This project is estimated to take 40 days to complete assuming that 30 residential properties require remediation.

For the purposes of this initial removal action, cleanups will be initiated at properties with asbestos contamination levels of 1% or greater. Surface soils with detectable levels of contamination will be removed. The excavation depth will be approximately 18 inches.

In accordance with Section 300.415(l), EPA will pursue appropriate arrangements for

post-removal site controls at the disposal site to ensure the long-term integrity of the removal. EPA has not yet made a decision regarding NPL listing for the Site. The proposed removal actions should compliment and contribute to the overall success of any remedial actions in the future.

As this cleanup is being conducted as a Time-Critical Removal Action, all Federal and State ARARs may not have been identified at this time. In accordance with the NCP, all ARARs for the Site will be attained to the extent practicable, given the scope of the project and the urgency of the situation as they are identified.

Many of the ARARS identified for these Removal Actions come from the Clean Air Act National Emission Standards for Hazardous Pollutants (NESHAPS) for asbestos. These regulations were designed specifically for renovation and demolition of buildings with asbestos containing material (ACM) such as floor tile, ceiling tile and pipe wrapping. The regulations were not designed for piles of unexpanded vermiculite, contaminated soils, or heavily contaminated dust. As such, it is anticipated that it may not be practicable to achieve all ARARS during this Removal Action.

B. Estimated Costs

The following cost estimates include costs associated with the residential removal actions for purposes of creating a total project ceiling. These costs are being estimated anticipating that the project will need to be performed as a fund lead action. The costs do not include any past or future investigation costs on the Site. Costs are projected as follows:

EXTRAMURAL COSTS

Cleanup Contractor Costs	\$ 645,000
Contingency (15%)	\$ 96,750
Subtotal	\$ 741,750
START	\$ 30,250
Extramural Subtotal	\$ 772,000
Extramural Contingency (10%)	\$ 77,200
TOTAL, EXTRAMURAL COSTS	\$ 849,200

INTRAMURAL COSTS

U.S. EPA Direct Costs \$30 x (500 Regional Hours + 50 H.Q. hours)	\$ 16,500
U.S. EPA Indirect Costs \$65 x 500 Regional Hours	\$ 32,500
TOTAL INTRAMURAL COSTS	\$ 49,000
 TOTAL PROJECT CEILING	 \$ 898,200

A detailed cleanup contractor cost breakdown is available as Attachment 1.

VI. EXPECTED CHANGE IN THE SITUATION SHOULD ACTION BE DELAYED OR NOT TAKEN

Delayed action will increase public health risks to the local population/environment posed by asbestos fibers in the residential alleys and yards.

VII. OUTSTANDING POLICY ISSUES


Asbestos removals have been completed in Region 5, and around the country at numerous removal sites which were initiated under Section 300.415 of the NCP and in compliance with NESHAPS regulation under 40 CFR Section 61.150. This removal does not set a precedent or constitute a nationally significant issue. Because of the potentially broad impact of the vermiculite ore with high levels of amphibole asbestos mined from the Libby, Montana deposits, EPA Region 5 is coordinating with EPA Headquarters and other regions to assure a consistent approach to vermiculite issues.

VIII. ENFORCEMENT

For administrative purposes, information concerning the enforcement strategy for this Site is contained in the attached Enforcement Confidential Addendum.

IX. RECOMMENDATION

This decision document represents the selected initial Removal Action for the residential portion of the Western Mineral Products Site, located in Minneapolis, Hennepin County, Minnesota, developed in accordance with CERCLA as amended, and not inconsistent with the NCP. This decision is based on the Administrative Record for the Site. Conditions at the Site meet the NCP §300.415(b)(2) criteria for a Removal Action, and your approval is recommend. The total project ceiling, if approved, will be \$ 898,200. Of this, \$ 818,950 may be used for cleanup contractor costs. You may indicate your decision by signing below.

APPROVE: 
for William E. Muno, Director
Superfund Division

Date: 7/21/00

DISAPPROVE: _____
William E. Muno, Director
Superfund Division

Date: _____

Attachments:

- Figure 1 - Site and Residential Sample Location Map
- Attachment 1 - Cleanup Contractor Costs
- Attachment 2 - Administrative Record Index
- Attachment 3 - EPA Toxicologist's Memorandum
- Attachment 4 - Confidential Enforcement Attachment
- Attachment 5 - Environmental Justice Analysis

cc: K. Mould, U.S. EPA HQ, 203G
D. Henne, U.S. Department of Interior, **w/o Enforcement Addendum**
J. Connell, Minnesota Pollution Control Agency, **w/o Enforcement Addendum**

Peder Larson, w/o Enforcement Addendum
Commissioner's Office
Minnesota Pollution Control Agency
520 Lafayette
St. Paul, MN 55155-4194

Rita Messing, Ph.D., w/o Enforcement Addendum
Minnesota Department of Health
121 E. 7th Place
St. Paul, MN 55101

Rodney Sando, w/o Enforcement Addendum
Commissioner's Office
500 Lafayette
St. Paul, MN 55155-4037

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WESTERN MINERAL PRODUCTS SITE

**HAS BEEN REDACTED
(1 PAGE)**

Attachment 1
Cleanup Contractor Costs

Personnel	\$ 114,000
Equipment	\$ 33,000
Disposal	\$ 84,000
Other Direct Costs	\$ 414,000
TOTAL	\$ 645,000

ATTACHMENT 2

**U.S. ENVIRONMENTAL PROTECTION AGENCY
REMOVAL ACTION**

**ADMINISTRATIVE RECORD
FOR
WESTERN MINERAL PRODUCTS SITE
MINNEAPOLIS, HENNEPIN COUNTY, MINNESOTA**

**ORIGINAL
SEPTEMBER 12, 2000**

<u>NO.</u>	<u>DATE</u>	<u>AUTHOR</u>	<u>RECIPIENT</u>	<u>TITLE/DESCRIPTION</u>	<u>PAGES</u>
1	09/11/00	Ecology and Environment, Inc.	U.S. EPA	Letter Report for the Residential Portion of the Western Mineral Products Site	118
2	00/00/00	Zintak, L., U.S. EPA	Muno, W., U.S. EPA	Action Memorandum: Request for a Time- Critical Removal Action Approval at the Western Mineral Products Site (PENDING)	



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

MEMORANDUM [9/6/2000]

SUBJECT: Exposure to amphibole asbestos fiber contamination in residential areas associated with the Western Minerals Products Site in Minneapolis, Hennepin County, Minnesota (Site ID # B5P2) poses an imminent and substantial endangerment to public health.

FROM: Mark D. Johnson Ph.D., DABT.
Regional Toxicologist

TO: Leonard N. Zintak, Jr., On-Scene Coordinator
Emergency Response Section 3

I PURPOSE

This memorandum addresses the rationale for determination of an imminent and substantial endangerment to public health posed by exposure to residual amphibole mineral fiber contamination at the former Western Minerals vermiculite processing facilities and in the residential areas containing waste material generated at the facility. The Western Mineral Products site received process vermiculite ore from the mine in Libby, MT by rail. Expansion of the raw ore occurred inside the building at 1720 Madison Street. Expansion was accomplished by heating the ore, usually in a dry kiln, to approximately 2000 °F, which boiled the water trapped in the crystalline matrix of the vermiculite, thus expanding the material by a factor of 10 to 15 fold. The waste product from the expansion process, also known as "Stoner Rock," was discarded at the loading dock into a large pile on the western side of the facility. A sign indicating that "Free Crushed Rock" was available was located above the pile. Over an estimated period of 40 yrs, local residents were reported to have taken this waste stoner rock material, to be used for a variety of purposes, including garden soil conditioning, driveway and yard fill, sandbox fill material, barbeque grill additive, and indoor insulation. Analysis of soil samples collected by EPA in the area where the former piles occurred show very high concentrations (~20%) of amphibole asbestos. Bundles of this asbestos material are extremely abundant in the surface soil near the loading dock on the west side of the facility.

Mineral fibers of this solid solution series are the focus of the present EPA investigation in

Libby. Amphibole mineral fibers of the tremolite-actinolite-richterite-winchite solid solution series (figure 1, hereafter referred to as 'tremolite, amphibole, or asbestos'), have been found in the Libby ore deposit. Occupational exposure studies of mine workers in Libby have demonstrated that exposure to these tremolite solution series fibers is associated with a significant level of asbestos-related disease (asbestosis, mesothelioma, lung cancer) and death of workers and family members of workers. Investigations of former workers at the Western Minerals site have indicated a significant number of cases of asbestos-related disease. In addition, several cases of asbestos disease have been reported in individuals who had no known asbestos exposure, but played as children in the stoner rock piles at Western Minerals. Those individuals also lived immediately across the street from the facility and could also have received exposure from airborne releases from the facility. In the interest of protecting public health, I recommend that appropriate actions be initiated to reduce or eliminate exposure to mineral fibers at the Western Minerals site and residences where the waste stoner rock material may be located.

II SUMMARY OF FINDINGS:

- 1) Fibrous mineral fibers found in the vicinity of the former Western Minerals site are amphibole asbestiform in habit, are of respirable size, and are known to induce lung cancer, mesothelioma, and asbestosis upon inhalation exposure.**
- II The waste stoner rock material has been shown to be highly enriched for asbestos content. Locations where the waste stoner rock has been distributed are source areas for exposure to the residents. Physical disturbance of the material (e.g., driving a vehicle on a contaminated driveway surface, mowing a lawn containing this material, leaf collection activities by rake or leafblower on contaminated lawns, or wind action) can result into dispersion of asbestos fibers into the air.**
- II Amphibole material, apparently originating from contaminated driveways, has been observed to be distributed on adjacent surfaces, including alleys and residential streets. This dispersion into areas with higher traffic magnifies the potential for breaking the material into smaller and smaller sizes that would be more likely to become airborne and respirable. These are areas where there may also be a greater likelihood of human contact with the asbestos material.**
- II The contaminated soil and surfaces present an ongoing source of asbestos which can become entrained in air and can be transported on vehicles, pets, and shoes to homes and other areas of potential secondary human exposure.**

III BACKGROUND:

Vermiculite ore bodies on Zonolite mountain are associated with tremolite ranging in concentration to nearly 100% in selected areas (W.R. Grace). Although early exploration and mining efforts by the Zonolite Company focused upon the commercial viability of fibrous amphibole deposits found on Zonolite Mountain (DOI, 1928) no commercial production of tremolite is reported. Vermiculite was discovered in the Rainy Creek Mining District of Lincoln County, Montana in 1916 by E.N. Alley. Alley formed the Zonolite Company and began commercial production of vermiculite in 1921. Another company, the Vermiculite and Asbestos Company (later known as the Universal Insulation Company), operated on the same deposits (BOM, 1953). W.R. Grace purchased the mining operations in 1963 and greatly increased production of vermiculite until 1990 when mining and milling of vermiculite ceased. During early mining operations airborne fiber concentrations at the mine exceeded 100 fibers/cc in several job classifications (Amandus et al, 1987a). Airborne fiber concentrations in the residential area of Libby exceeded the present occupational Permissible Exposure Level (PEL) of 0.1 fiber/cubic centimeter established by OSHA 1994 (MRI, 1982; Eschenbach deposition). This exposure limit is considered to be associated with significant risk (3.4 additional asbestos-related cancers per 1000 individuals as per OSHA estimates) but is the practical lower limit of detection using phase contrast microscopy (PCM) as a measurement technique (OSHA, 1994).

Amphibole mineral fibers, including tremolite, are known to cause a variety of lethal and sub-lethal health effects as discussed below. Evidence of the lethal effects of exposure to tremolite from the vermiculite ore body on Zonolite Mountain is abundant. During the 1980s Lockey et al. (1984) and then the National Institutes for Occupational Safety and Health (NIOSH) (Amandus et al., 1987) conducted investigations of tremolite exposure and the morbidity and mortality of workers in various aspects of the mining, milling and refining process. These investigations, conducted during active vermiculite mining and processing activities in Libby, MT demonstrated multiple cases of lung cancer, mesothelioma, and asbestosis in workers exposed to variable concentrations of tremolite fiber at the mine. These findings were independently confirmed by concurrent investigations conducted by MacDonald et al., (1986).

Since the cessation of vermiculite mining and processing operations in Libby, local physicians and nearby pulmonary specialists have continued to identify individuals suffering from asbestosis, lung cancer and mesothelioma as a result of exposure to tremolite mineral fibers. One pulmonologist has seen more than 250 cases of asbestos-related disease from the Libby area (Whitehouse, 2000). While 142 of these individuals are believed to have been occupationally exposed during vermiculite mining operations, 29 individuals were secondarily exposed through household contact. Eleven cases are reported to have no connection with former mining or processing activities. These estimates are derived from a single physician working in the vicinity of Libby. Actual numbers of affected individuals are unknown and may be considerably higher.

IV ENDANGERMENT RATIONALE:

The rationale for determination of an imminent and substantial endangerment from exposures at the former Western Minerals site is:

- 1) Epidemiological studies workers from the Libby vermiculite mine have demonstrated that exposure to the amphibole asbestos fibers in this vermiculite ore and processing by-products of the vermiculite ore are associated with a variety of lethal and sub lethal health effects in former workers, families of workers, and in non-occupationally exposed members of the Libby community. In addition, a significant number of former workers at the Western Minerals vermiculite exfoliation facility have developed asbestos-related disease. Also, several individuals with only childhood exposure to the waste stoner rock material at Western Minerals have developed asbestos-related disease, with at least one death.
- 2) Detection of high levels of amphibole asbestos concentration (up to 20%) in samples taken in surface and subsurface soils at the site. These fibers represent a significant source of exposure to current workers and to nearby residents as a result of air dispersion of fibers. The highest levels were detected in areas immediately across the street from residences.
- 3) Detection of high levels of amphibole asbestos concentration (up to 80%) in surface soil and dust samples taken in residential yards, driveways, alleys, and streets within one block of the facility. Complete human exposure pathways (by inhalation and ingestion) have been positively identified by personal observation and empirical measurement;
- 4) The presence of amphibole asbestos material containing fibers of respirable and carcinogenic dimensions represents a significant health threat for human exposure.

A. Health Effects of Tremolite Asbestos: Hazard Assessment

Fibrous minerals found in association with the Libby vermiculite are members of a solid solution series of hydrated magnesium silicates in which varying amounts of iron (Fe^{2+}), sodium (Na^+), and aluminum (Al^{3+}) can substitute for calcium and magnesium in the solid solution. The solid solution series includes tremolite $[\text{Ca}_2\text{Mg}_3(\text{Si}_8\text{O}_{22})(\text{OH})_2]$, actinolite $[\text{Ca}_2(\text{Fe}^{2+}, \text{Mg})_3(\text{Si}_8\text{O}_{22})(\text{OH})_2]$, richterite $[\text{Na}(\text{CaNa})(\text{Mg}, \text{Fe}^{2+})_3(\text{Si}_8\text{O}_{22})(\text{OH})_2]$, and winchite $[\text{NaCa}(\text{Mg}, \text{Fe}^{2+})_4\text{AlSi}_8\text{O}_{22}(\text{OH})_2]$. Collectively with other minerals such as anthophyllite and amosite, these materials are referred to as amphiboles. In their fibrous habit, as identified in the ore body on Zonolite mountain, in association with un-expanded vermiculite, and in the exfoliated or expanded vermiculite product, these materials are generally referred to as asbestos

(Eschenbach, 1983) and are capable of causing significant human morbidity and mortality upon inhalation.

Health effect associated with fiber exposure from the Libby facilities is documented in a variety of technical reports (EPA 1980; EPA 1985; EPA 1986), and peer-reviewed studies. Lockey et al. (1984) demonstrated pleural radiographic changes and pleuritic chest symptoms in occupationally exposed workers with exposure to tremolite fiber from Libby. A detailed study of occupational exposure to tremolite during vermiculite ore processing documented significant increases of non-malignant respiratory disease and lung cancer in workers (Amandus et al., 1987a; Amandus and Wheeler, 1987). In a study conducted concurrently with the NIOSH investigation, McDonald et al. (1986) determined independently that workers in the mine experienced a "serious hazard from lung cancer, pneumoconiosis, and mesothelioma" as a result of exposure to tremolite fibers associated with the vermiculite processing.

In addition to effects associated with inhalation exposure to mineral fibers several studies indicate elevated risk of gastrointestinal cancer following exposure (Seidman et al., 1986; Ehrlich et al., 1991; Gerhardsson de Verdier et al., 1992).

B. Identification of Tremolite fibers at the Western Minerals site and Surrounding Residential Area: *Exposure Assessment*

Surface soil samples were analyzed by Polarized Light Microscopy (PLM), followed by Transmission Electron Microscopy (TEM) and Energy Dispersive X-Ray Spectrometry (EDX). Analysis of the samples by Analytical results indicated a significant percentage of samples with detectable tremolite-actinolite asbestos (Table 1).

Table 1: Summary of soil samples from Western Minerals and surrounding residential area

Location	# samples taken	#samples with detectable asbestos	% asbestos	asbestos type
Industrial property	23	16 samples: >1% 5 samples: trace	1-20%	tremolite-actinolite
Residential properties	9	7 samples: >1% 2 samples: trace	6-80%	tremolite-actinolite

TEM/EDX revealed abundant amphibole fibers of the tremolite-actinolite solution series.

Elemental analysis of the fibers showed the presence of a sodium peak, consistent with the mineral Richerite that is found in the Libby vermiculite ore. Fiber dimensions (length and width) have been shown to have an important impact on fiber toxicity (Berman et al., 1995; Blake et al., 1998; Castranova, 1998; Jianping, 1999). Clearance of fibers from the lung is inhibited and fiber toxicity is significantly enhanced when fiber length is greater than approximately 8µm (Blake et al., 1998). Analysis of fiber dimensions from these samples have indicated a significant proportion of fibers greater than 5 µm in length and aspect ratios (length to width) of 10-20:1.

The collection of residential samples focused on areas where the waste stoner rock was distributed for a variety of purposes. Analysis of this material indicates that it is highly enriched for amphibole asbestos, compared to vermiculite ore or the finished vermiculite insulation product. These samples were taken from areas such as yards, driveways, and alleys where there would be frequent human exposure. It would be expected that children would have an even greater exposure due to the nature of their recreational activities. Children are especially susceptible to mesothelioma due to their longer life expectancy relative to the latency of the disease (EPA, 1986).

The route of exposure that represents the greatest health concern is the inhalation of airborne fibers, dispersed from soil or concrete surfaces by the action of pedestrian or vehicular traffic, or by wind dispersion. Several measurements have been made to estimate air concentrations resulting from the handling of asbestos-contaminated soils and bulk materials, and may serve as a basis for estimating the potential air dispersion of asbestos fibers in the stoner rock in residential areas. Addison et al., (1988) generated airborne dust clouds from mixtures of soil containing asbestos concentrations from 1 to 0.001% by weight. Dust concentrations were maintained at 5 mg/M³ for 4 hours prior to measurement of airborne asbestos. The results indicated that, even the lowest soil asbestos concentrations (0.001%) were able to produce airborne asbestos concentrations which greatly exceed recommended human exposure limits. A similar investigation conducted by EPA (1994) indicated the likelihood of elevated airborne asbestos concentrations as a result of vehicular traffic along roadways constructed of serpentine rock. Though more realistic than the Addison study in terms of human exposure, the results of the EPA investigation also indicated significant risks associated with vehicle traffic along roadways containing 0.006 weight percent asbestos by TEM analysis.

In addition to the dispersion of fibers into the air, the frictional forces of foot and vehicular traffic on these surfaces would be expected to facilitate the breakdown of the amphibole asbestos bundles into smaller and more respirable fibers over time.

V CONCLUSION:

One of the main concerns about asbestos fiber exposure is that the dose is cumulative. Fibers of the dimensions identified in these samples have characteristics indicating that when inhaled they will penetrate deep into lung tissue and will persist due to their low clearance rate from the lungs. Studies have shown that tremolite asbestos is more stable than other forms of asbestos, which will further contribute to the accumulation of fibers in lung tissue. Children exposed to these fibers are of greatest risk due to the relatively long latency period for the asbestos-associated diseases, asbestosis, lung cancer and mesothelioma.

Unlike chemicals that can degrade in the environment, asbestos fibers from this material will persist and will continue to be generated due the presence of the relatively large mass of amphibole bundles. This evidence clearly indicates that the amphibole asbestos material in the residential soil at these locations is of a significant mass and fiber characteristics to pose an imminent and substantial threat to public health.

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ATTACHMENT 4

ENFORCEMENT ADDENDUM

**Western Mineral Products Site
Hobart, Lake County, Indiana**

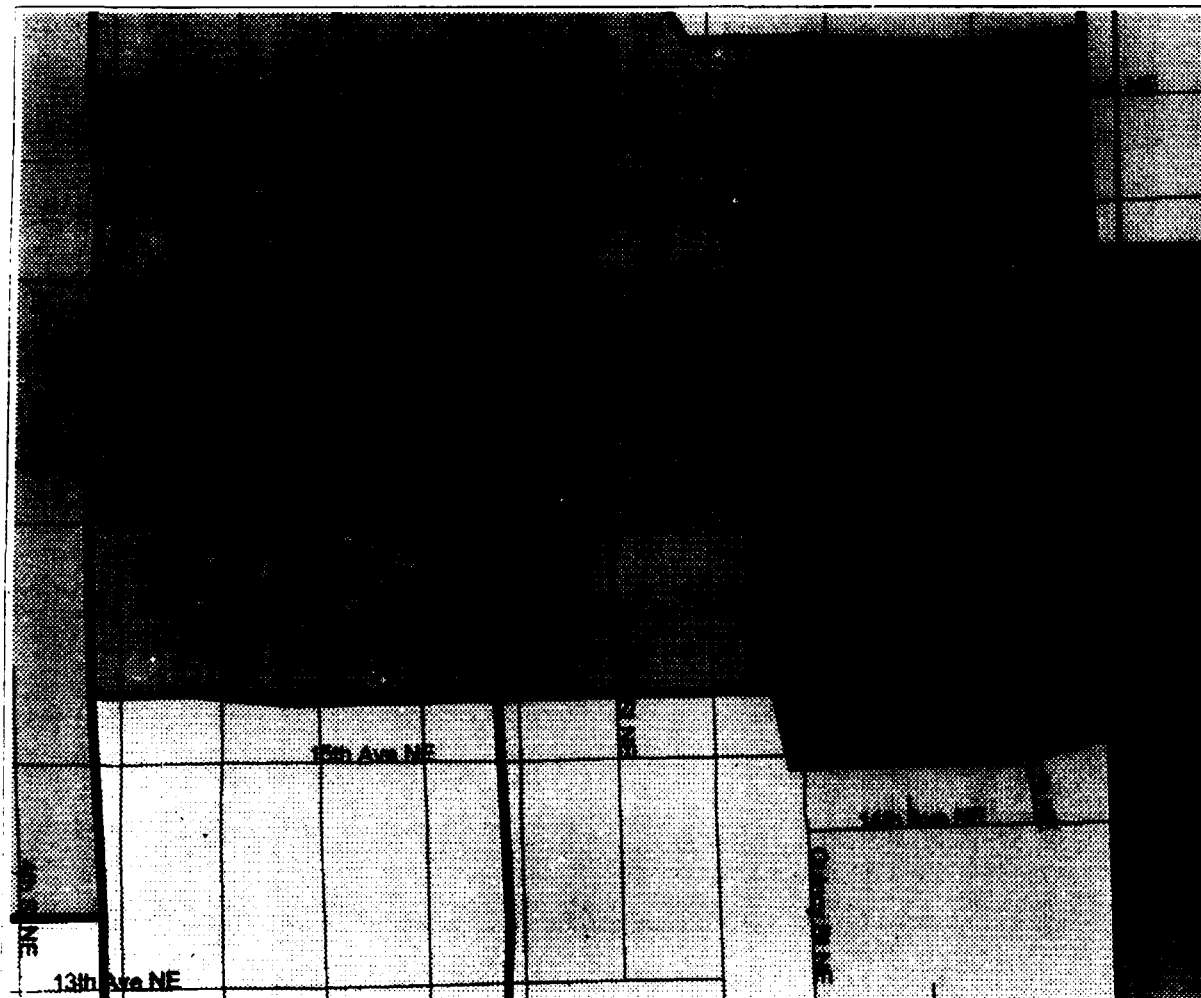
August 2000

**HAS BEEN REDACTED
(2 PAGES)**

NOT RELEVANT TO THE SELECTION OF THE REMOVAL ACTION

Region 5 Superfund EJ Analysis

Western Mineral Products Site Minneapolis, MN



EJ Identification

- Low Income and Minority Less than State Average
- Low Income or Minority at or Greater than State Average
- Low Income or Minority 2 Times or Greater than State Average
(meets Region 5 EJ Case criteria)

★ Site Location

Block Group Boundary

Region 5 EJ Case Criteria for Minnesota:

Minority: 12% or greater

Low Income: 54% or greater



U.S. Environmental Protection Agency
Region 5 Office

Date of Map 08/24/00

Source of Map: 1990 Census Data: 1990



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

OFFICE OF
SOLID WASTE AND EMERGENCY
RESPONSE

September 26, 2000

MEMORANDUM

SUBJECT: Request for Concurrence in a Time-Critical Removal
Action at the Western Mineral Products Site in
Minneapolis, Hennepin County, Minnesota
(Site ID # E5P2)

FROM: Larry G. Reed, Acting Director
Office of Emergency and Remedial Response

Paul F. Haden
(s-)

TO: Timothy Fields, Jr.
Assistant Administrator

We recently received the attached Action Memo from Region 5 for the Western Minerals Products site. The Action Memo describes the extent of contamination and potential for exposure, the establishment of a hazard for asbestos, and the planned actions. This site received vermiculite ore that was shipped from the mine in Libby, Montana. Given the association with the vermiculite ore from Libby, Montana, there has been extensive coordination between OERR and the Region on this site. Our review indicates that the action taken is consistent with other asbestos cleanups. I recommend you concur in Region 5's request.

Attachment

Concur:

Timothy Fields, Jr.

Date:

10/10/00

Non-Concur:

Date:

cc: Rick Karl, EPA Region 5

Attachment 2

Cleanup Contractor Costs

Personnel	\$ 158,040
Equipment	\$ 12,300
Disposal	\$ 84,000
Other Direct Costs	\$ 19,740
TOTAL	\$ 274,080

ATTACHMENT

**U.S. ENVIRONMENTAL PROTECTION AGENCY
REMOVAL ACTION**

**ADMINISTRATIVE RECORD
FOR
WESTERN MINERAL PRODUCTS SITE
MINNEAPOLIS, HENNEPIN COUNTY, MINNESOTA**

**ORIGINAL
SEPTEMBER 12, 2000**

<u>NO.</u>	<u>DATE</u>	<u>AUTHOR</u>	<u>RECIPIENT</u>	<u>TITLE/DESCRIPTION</u>	<u>PAGES</u>
1	09/11/00	Ecology and Environment, Inc.	U.S. EPA	Letter Report for the Residential Portion of the Western Mineral Products Site	118
2	09/21/00	Zintak, L., U.S. EPA	Muno, W., U.S. EPA	Action Memorandum: Request for a Time- Critical Removal Action Approval at the Western Mineral Products Site (PORTIONS OF THIS DOCU- MENT HAVE BEEN REDACTED)	29

**UPDATE #1
JULY 26, 2001**

1	10/18/00	Zintak, L. & S. Vega, U.S. EPA	Distribution List	POLREP #1 for the Western Mineral Products Residen- tial Sites	5
2	10/26/00	Zintak, L. & S. Vega, U.S. EPA	Distribution List	POLREP #2 for the Western Mineral Products Residen- tial Sites	3
3	11/02/00	Zintak, L. & S. Vega, U.S. EPA	Distribution List	POLREP #3 for the Western Mineral Products Residen- tial Sites	4
4	11/08/00	Zintak, L. & S. Vega, U.S. EPA	Distribution List	POLREP #4 for the Western Mineral Products Residen- tial Sites	4
5	00/00/00	Vega, S., U.S. EPA	Muno, W., U.S. EPA	Amended Action Memo for Phase II of the Time- Critical Removal Action at the Western Mineral Products Site (PENDING)	

ATTACHMENT 4



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

SEP 13 2001

REPLY TO THE ATTENTION OF

MEMORANDUM

SUBJECT: Request for an Exemption from the 12-month Statutory Limit, and Request for a Ceiling Increase for the Phase II of the Time-Critical Removal Action at the Western Mineral Products Site in Minneapolis, Hennepin County, Minnesota (Site ID #B5P2)

FROM: Sonia R. Vega, On-Scene Coordinator
Emergency Response Branch - Section 3

TO: William E. Muno, Director
Superfund Division

THRU: Richard Karl, Chief *R. Karl*
Emergency Response Branch

I. PURPOSE

The purpose of this memorandum is to request an exemption from the 12-month statutory time limit, and to request and document a project ceiling increase of \$882,292 for the Phase II of the time-critical removal action at the Western Mineral Products Site, Minneapolis, Hennepin County, Minnesota. The increase will bring the total project ceiling to \$1,780,492. On September 21, 2000, William E. Muno, Director, Superfund Division, signed the original Action Memorandum, and on July 27, 2001, Mr. Muno signed an amendment to the original Action Memorandum to document approval to conduct Phase II of the time-critical removal action at the residential component of the Western Minerals Products Site (the Site). Due to the success of its intensive public outreach program for the Site, U.S EPA has identified more residential properties for clean up than it originally estimated.

Section 104(c) of the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA) allows the statutory 12-month time limit for a removal action to be exceeded if the removal action meets the three components for an exemption (see Section V).

This site is not on the National Priorities List.

II. SITE CONDITIONS AND BACKGROUND

CERCLIS ID#: MNN 000 508 056

A. Site Description and Background

Refer to initial Action Memorandum dated September 21, 2000, and amended Action Memorandum, dated July 27, 2001, attached, for a description of Site conditions and the response actions selected for the Site.

B. Actions to Date and Current Situation

U.S. EPA has begun and will continue the removal action addressed in the action memoranda dated September 21, 2000, and July 27, 2001, and all the ancillary and supporting activities. The Site has been addressed in two phases. During Phase I, completed in November 2000, among other things, U.S. EPA:

1. Conducted visual inspections at 304 residential properties for the presence of vermiculite processing waste products, leaving 90 to be inspected during Phase II;
2. Vacuumed asbestos contaminated materials from 16 alleys/driveways;
3. Excavated asbestos contaminated materials at, and fully restored 13 residential properties;
4. Excavated asbestos contaminated materials at 10 additional homes that would require further excavation/restoration in Phase II;
5. Identified another 22 properties requiring clean up work in Phase II; and
6. Identified 5 residential properties that required further evaluation, and sampling, to determine the presence of asbestos contamination.

During Phase II, initiated August 6, 2001, U.S. EPA has continue to mitigate the threat to public health and the environment posed by the presence of asbestos contamination on residential properties surrounding the Western Mineral plant. As of August 25, 2001, U.S. EPA has completed the following since the issuance of the July 27, 2001, Amended Action Memorandum:

1. Conducted visual inspection at 161 more residential properties for the presence of vermiculite processing waste products;
2. Vacuumed asbestos contaminated materials from 2 more alleys/driveways;
3. Completed excavation of asbestos contaminated materials and fully restored 14 more residential properties;
4. Completed excavation and full restoration at 9 properties started on Phase I;
5. Identified 25 more properties requiring clean up work (in addition to 21 other previously identified properties that were not addressed during Phase I);
6. Identified 14 more residential properties that require further evaluation and

sampling to determine the presence of asbestos contamination.

C. Request for Ceiling Increase

The original Action Memorandum dated September 21, 2000, estimated that approximately 30 residential properties would require clean up in Phase I. U.S. EPA actually identified 45 properties requiring clean up during that phase, many of which were targeted for clean up during Phase II.

As of September 6, 2001, U.S. EPA has identified more than 25 homes that must be addressed in Phase II. U.S. EPA also has an additional 120 residential properties awaiting inspection. As of September 6, 2001, cleanups have been required at roughly 15% of the homes inspected (70 out of approximately 465). It is therefore safe to assume that U.S. EPA may identify an additional 15 residential properties requiring clean up. Additional contractor hours and equipment will be required to complete this task this year. Also, transportation and disposal costs will increase. Even with additional crews, the expanded workload will likely require U.S. EPA to extend this removal action for longer than 12 months after September 2000, when removal activities began on Site.

Additional funds are being requested to cover uncertainties associated with the potential for more residential properties requests for inspection and the possibility of finding yet more properties requiring clean up actions.

III. THREATS TO PUBLIC HEALTH OR WELFARE OR THE ENVIRONMENT, AND STATUTORY AND REGULATORY AUTHORITIES

For more detailed information, refer to the attached Action Memorandum dated September 21, 2000.

The conditions at the residential component of the Western Mineral Products Site meet the criteria for a removal action as stated in the National Contingency Plan (NCP), Section 300.415(b)(2), specifically:

- i) Actual or potential exposure to nearby human populations, animals, or the food chain from hazardous substances or pollutants or contaminants;

The concentration of asbestos contaminated materials found in the residential alleys, and in surface soils indicate a potential for human exposure.

- iv) High levels of hazardous substances in soils largely at or near the surface, that may migrate;

Pieces of amphibole asbestos are visible at the surface on residential sites.

- v) **Weather conditions that may cause hazardous substances or pollutants or contaminants to migrate or be released;**

Temperature, winds and runoff may contribute to the dispersion of contaminated materials.

- vii) **The (lack of) availability of other appropriate federal or state mechanism to respond to the release;**

No other local, state or federal agency is in the position or currently has the resources to independently implement an **effective** response action.

IV. ENDANGERMENT DETERMINATION

Given the Site conditions, the nature of the suspected hazardous substances on Site, and the potential exposure pathways described in Sections II and III above, actual or threatened releases of hazardous substances from this Site, if not addressed by implementing and completing all of the response actions selected in these Action Memoranda dated September 21, 2000 and July 27, 2001, may present an imminent and substantial endangerment to public health, or welfare, or the environment.

V. EXEMPTION FROM STATUTORY LIMITS

Conditions at the Western Mineral Products Site warrant the 12-month exemption request based on the following factors:

1. **"There is an immediate risk to public health or welfare or the environment;"**

High levels of asbestos contaminated materials are present at surface level on residential properties which are easily accessible to the public.

2. **"Continued response actions are immediately required to prevent, limit, or mitigate an emergency;"**

For reasons stated above, this component applies. Because of the expanded number of homes identified for cleanup, the removal action will take slightly longer than 12 months to complete.

3. **"Assistance will not otherwise be provided on a timely basis;"**

Neither state nor local agencies have any resources to complete the remaining removal actions at this Site.

VI. PROPOSED ACTIONS AND ESTIMATED COSTS

A. Proposed Actions

The purpose of the continuation of this removal action is to mitigate the imminent and substantial threats posed to public health or welfare or the environment. Removal activities at the Site will include identification of other residential properties that require clean up actions, the removal and proper disposal of asbestos contaminated materials from these properties, and restoration of excavated areas. Specifically:

1. Develop and implement the Site-specific health and safety plan;
2. Determine the horizontal extent of asbestos contamination in the contaminated residential properties and identify areas to be remediated;
3. Excavate and remove asbestos contaminated materials to a maximum depth of 18 inches in the yards and alleys;
4. Dispose of the contaminated materials at an EPA-approved disposal facility in accordance with the EPA Off-Site Rule, 40 CFR § 300.440, 58 Federal Register 49215 (September 22, 1993);
5. Remove asbestos from the surface of paved alleys and driveways for disposal;
6. Perform personal and perimeter air monitoring during remediation activities;
7. Implement dust control measures during the remediation activities;
8. Install a synthetic liner at the bottom of the excavated areas prior to backfill;
9. Analyze bulk asbestos samples using standard Polarized Light Microscopy (PLM) methods. Supplement PLM analysis with Transmission Electron Microscopy (TEM).
10. Backfill excavated areas with clean soil and restore property to original pre-removal conditions.

For the purposes of the Phase II removal action, cleanups will take place at properties where significant visible asbestos contamination is present and those where a surface sample collected from the property indicates significant asbestos content, even if there is no visible contamination.

At this point is hard to estimate the duration of the project. On average, each property requires 1.5 days of on-site work to remediate. As of September 6, 2001, U.S. EPA

has identified 70 properties requiring clean up. There are an additional 120 properties to be inspected. Past experience showed a 15% inspection to clean up ratio.

Additional funding will be needed to complete this cleanup.

The response actions described in this memorandum directly address actual or threatened releases of hazardous substances, pollutants, or contaminants at the residential properties which may pose an imminent and substantial endangerment to public health and safety and to the environment.

B. Estimated Costs

The following cost estimates include costs associated with the completion of Phase II of the residential removal action. The estimate is based on the costs incurred so far since the beginning of Phase II. Costs are projected as follows:

Extramural Costs

Cleanup Contractor Costs	\$ 457, 560
Contingency (15%)	\$ 68, 634
Subtotal	\$ 526,194
START	\$ 58, 800
Extramural Subtotal	\$ 584, 994
Extramural Contingency (10%)	\$ 58, 499
Total Extramural	\$ 643, 493

Intramural Costs

U.S. EPA Direct Costs	
\$30.00 x (800 Regional Hrs + 70 H.Q. Hrs)	\$ 26, 100

<u>Indirect Costs</u>	\$ 212, 698
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TOTAL	\$ 882, 292
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VII. EXPECTED CHANGE IN THE SITUATION SHOULD ACTION BE DELAYED OR NOT TAKEN

Increased risk to public health and the environment will result if no or delayed action ensues. There would be continued exposure to high levels of asbestos in the soil by humans or animals.

VIII. OUTSTANDING POLICY ISSUES

None

IX. ENFORCEMENT

Enforcement efforts are documented in the original Action Memorandum for this Site.

X. RECOMMENDATION

This decision document represents the selected removal action for the Phase II of the residential time-critical removal at the Western Mineral Products Site in Minneapolis, Hennepin County, Minnesota, developed in accordance with CERCLA, as amended, and is not inconsistent with the NCP. This decision is based upon the Administrative Record for the site. Conditions at the Site meet the NCP Section 300.415(b)(2) criteria for a removal action and I recommend your approval of the proposed time exemption, and ceiling increase. You may indicate your decision by signing below.

APPROVE: W. E. Pyman DATE: 9/13/01
Director, Superfund Division

DISAPPROVE: _____ DATE: _____
Director, Superfund Division

Attachments

1. Update to the Index to the Administrative Record
2. Action Memorandum dated 9/21/2000
3. Action Memorandum dated 7/27/2001
4. Clean Up Contractor Costs
5. Enforcement Addendum

cc: C. Stanton, U.S. EPA HQ, 203-G
D. Henne, U.S. Dept. of the Interior, **w/o Enforcement Addendum**
J. Connell, Minnesota Pollution Control Agency, **w/o Enforcement Addendum**

Karen Studders, **w/o Enforcement Addendum**
Commissioner's Office
Minnesota Pollution Control Agency
520 Lafayette
St. Paul, Minnesota 55155-4194

Rita Messing, Ph.D., **w/o Enforcement Addendum**
Minnesota Department of Health
121 E. 7th Place
St. Paul, Minnesota 55101

Rodney Sando, **w/o Enforcement Addendum**
Commissioner's Office
500 Lafayette
St. Paul, Minnesota 55155-4037

ATTACHMENT 1

**U.S. ENVIRONMENTAL PROTECTION AGENCY
REMOVAL ACTION**

**ADMINISTRATIVE RECORD
FOR
WESTERN MINERAL PRODUCTS SITE
MINNEAPOLIS, HENNEPIN COUNTY, MINNESOTA**

**ORIGINAL
SEPTEMBER 12, 2000**

<u>NO.</u>	<u>DATE</u>	<u>AUTHOR</u>	<u>RECIPIENT</u>	<u>TITLE/DESCRIPTION</u>	<u>PAGES</u>
1	09/11/00	Ecology and Environment, Inc.	U.S. EPA	Letter Report for the Residential Portion of the Western Mineral Products Site	118
2	09/21/00	Zintak, L., U.S. EPA	Muno, W., U.S. EPA	Action Memorandum: Request for a Time-Critical Removal Action Approval at the Western Mineral Products Site (PORTIONS OF THIS DOCUMENT HAVE BEEN REDACTED)	29

**UPDATE #1
JULY 26, 2001**

1	10/18/00	Zintak, L. & S. Vega, U.S. EPA	Distribution List	POLREP #1 for the Western Mineral Products Residential Sites	5
2	10/26/00	Zintak, L. & S. Vega, U.S. EPA	Distribution List	POLREP #2 for the Western Mineral Products Residential Sites	3
3	11/02/00	Zintak, L. & S. Vega, U.S. EPA	Distribution List	POLREP #3 for the Western Mineral Products Residential Sites	4
4	11/08/00	Zintak, L. & S. Vega, U.S. EPA	Distribution List	POLREP #4 for the Western Mineral Products Residential Sites	4
5	07/26/01	Vega, S., U.S. EPA	Muno, W., U.S. EPA	Amended Action Memo for Phase II of the Time-Critical Removal Action at the Western Mineral Products Site (PORTIONS OF THIS DOCUMENT HAVE BEEN REDACTED)	38

<u>NO.</u>	<u>DATE</u>	<u>AUTHOR</u>	<u>RECIPIENT</u>	<u>TITLE/DESCRIPTION</u>	<u>PAGES</u>
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UPDATE #2
SEPTEMBER 10, 2001

1	00/00/00	Vega, S., U.S. EPA	Muno, W., U.S. EPA	Action Memorandum: Request for an Exemption from the 12-Month Statutory Limit and Request for a Ceiling Increase for Phase II of the Time-Critical Removal Action at the Western Mineral Products Site (PENDING)	
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ATTACHMENT 2



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

SEP 21 2000

REPLY TO THE ATTENTION OF: SE-5J

ACTION MEMORANDUM

SUBJECT: Request for a Time-Critical Removal Action approval at the Western Mineral Products Site in Minneapolis, Hennepin County, Minnesota (Site ID # B5P2).

FROM: Leonard N. Zintak, Jr., On-Scene Coordinator
Emergency Response Section 3

TO: William E. Muno, Director
Superfund Division

THRU: Richard C. Karl, Chief
Emergency Response Branch

I. PURPOSE

The purpose of this action memorandum is to request and document approval to expend up to \$898,200 to conduct a time-critical removal action at the Western Mineral Products Site located in Minneapolis, Hennepin County, Minnesota. Specifically, the proposed removal action will address the contaminated residential properties surrounding the industrial portion of the site.

This removal action addresses the need to mitigate the threats to the local population and the environment posed by fibrous amphibole asbestos that was released into the environment from the industrial portion of the site as a result of the processing of vermiculite ore and disposal of associated waste products. High concentrations of amphibole asbestos posing a public health threat have been detected on and in the areas surrounding the former Western Mineral Products/W.R. Grace property and on the adjacent Electramatic property. These properties are herein referred to as the industrial sites. Also, high concentrations of amphibole asbestos have been detected in the residential areas (residential sites) surrounding the industrial sites.

The proposed removal action will address immediate health threats identified in the residential areas during EPA's sampling in Northeast Minneapolis which occurred from March through



August 2000. EPA plans to conduct further sampling at the residential sites which surround the industrial site and in other areas that may have been impacted by the vermiculite processing operations at the Site. This subsequent sampling, analysis and evaluation may identify additional time-critical threats at other residential sites.

This site is not on the National Priorities List (NPL).

II. SITE CONDITIONS AND BACKGROUND

CERCLIS ID # MNN 000 508 056

A. Site Description and Background

The industrial sites are located at 1720 Madison Street N.E. and 1815 Jefferson Street N.E., Minneapolis, Hennepin County, Minnesota, and are bordered on the east by Burlington Northern Santa Fe railroad tracks, on the north by commercial buildings and west by residential properties and a city maintenance facility, and on the south by a commercial building.

The industrial sites consist of two parcels of land, one currently owned by Madison Complex, Inc. and the other currently owned by Electramatic, Inc. The site is occupied by a three-story brick office building, a brick warehouse structure, two four-story silos, and the Electramatic building to the north. The remaining portions of the industrial sites are parking lots and an abandoned section of 18th Street that divides the two parcels of land. The abandoned section of 18th Street is now owned by Electramatic and Madison Complex.

Western Mineral Products Company, a Minnesota company, operated at 1720 Madison Street N.E. as an independent company from 1946 to 1966. During part of this time it was a licensee of the Zonolite Company, a Montana Company. W.R. Grace acquired the Zonolite Company through a merger on April 16, 1963. The property at 1720 Madison was sold by W.R. Grace to Madison Complex, Inc. on October 24, 1989 by deed dated September 29, 1989. Allegedly, in 1990, W.R. Grace removed all materials that were stored in the two silos. The property at 1720 Madison is currently leased to Panel Specialties, Inc.(PSI), which manufactures prison furniture and security equipment on the property.

The Western Mineral Products Site at 1720 Madison Street N.E. processed vermiculite

ore that was shipped from the mine in Libby, Montana. The vermiculite ore body in Libby, Montana also contained amphibole asbestos fibers of the tremolite-actinolite-richterite-winchite solid solution series (herein referred to as amphibole asbestos) (Bureau of Mines Monograph, 1928). Unlike the commercially exploited chrysotile asbestos, the tremolite-actinolite material has never been used commercially on a wide scale, and for most of the mine's operating life was considered a contaminant. The commercially exploited vermiculite was used in a variety of insulation products and construction materials, as a carrier for fertilizer and other agricultural chemicals, and as a soil conditioner.

At the mine in Libby, Montana, the vermiculite ore was strip mined using conventional equipment and then processed in an on-site dry mill to remove waste rock and overburden. Once beneficiated, the processed ore was trucked to a screening plant, which separated the milled ore into five size ranges for use in various products. From there, the material was shipped across the country, predominantly by rail, for either direct inclusion in products, or for expansion (also known as exfoliation) prior to use in products.

The Western Mineral Products site in Minneapolis, Minnesota received Libby ore by rail. Expansion of the raw ore occurred inside the building at 1720 Madison Street. Expansion was accomplished by heating the ore, usually in a dry kiln, to approximately 2000 °F, which boiled the water trapped in the crystalline matrix of the vermiculite, thus expanding the material by a factor of 10 to 15 fold. The waste product from the expansion process contained high concentrations of amphibole asbestos. This waste product, also known as "Stoner Rock", was placed outside the building in a pile and was labeled as "Free Crushed Rock". The residents in the neighborhood were encouraged to take the waste material to use as fill on their properties. Residents hauled the "Free Crushed Rock" to their homes in their pickup trucks and cars. Allegedly the asbestos contaminated material was placed in yards, gardens, sandboxes, and barbeque grills. This practice may have occurred for more than 40 years.

B. Removal Site Assessment

Between February and August 2000, the U.S. EPA Emergency Response Branch conducted site assessment activities to determine the potential health threat posed by amphibole asbestos-containing wastes which were produced at the former Western Mineral Products/W.R.Grace facility at 1720 Madison and deposited outside the plant and on residential properties in the surrounding neighborhood.

As part of a national evaluation of facilities that received vermiculite ore from the Libby,

Montana mine, the U.S. Environmental Protection Agency (EPA) Region 5 Emergency Response Branch conducted an initial site visit on February 2, 2000. The initial investigation consisted of a brief inspection and sampling of the former processing building and property, and interviews with State and local officials and some members businesses operating in the area.

During the investigation EPA observed exfoliated vermiculite insulation inside the building in a ceiling area on the first floor. Also, there was visible vermiculite in the surface soils around the building. Samples were collected from these areas and were analyzed using polarized light microscopy (PLM) and transmission electron microscopy (TEM). These samples indicated trace amounts of asbestos at concentrations less than 1% by visual estimate. On April 13, 2000, U.S. EPA returned to the site to perform additional of the surface soil and indoor insulation. While the indoor samples did not detect any asbestos, the three soil samples indicated levels between 2 % and 20 % asbestos. This finding triggered additional investigatory work and also a public meeting at the nearby armory in Northeast Minneapolis on April 13, 2000. At public meeting the local residents and the news media were updated on the national and local investigation of the vermiculite sites associated with the Libby, Montana mine. At the public meeting many residents expressed their concern with the adverse health effects associated with the Western Mineral Products site. Many of the former workers from the Site have contracted asbestosis or mesothelioma, both asbestos-related diseases.

These findings led EPA to initiate a residential property investigation with the following goals:





1. Visually identify asbestos contamination in alleys and yards;
2. Sample and analyze residential areas for asbestos;
3. Conduct door-to-door community outreach to determine the extent of contamination in the residential areas around the site.

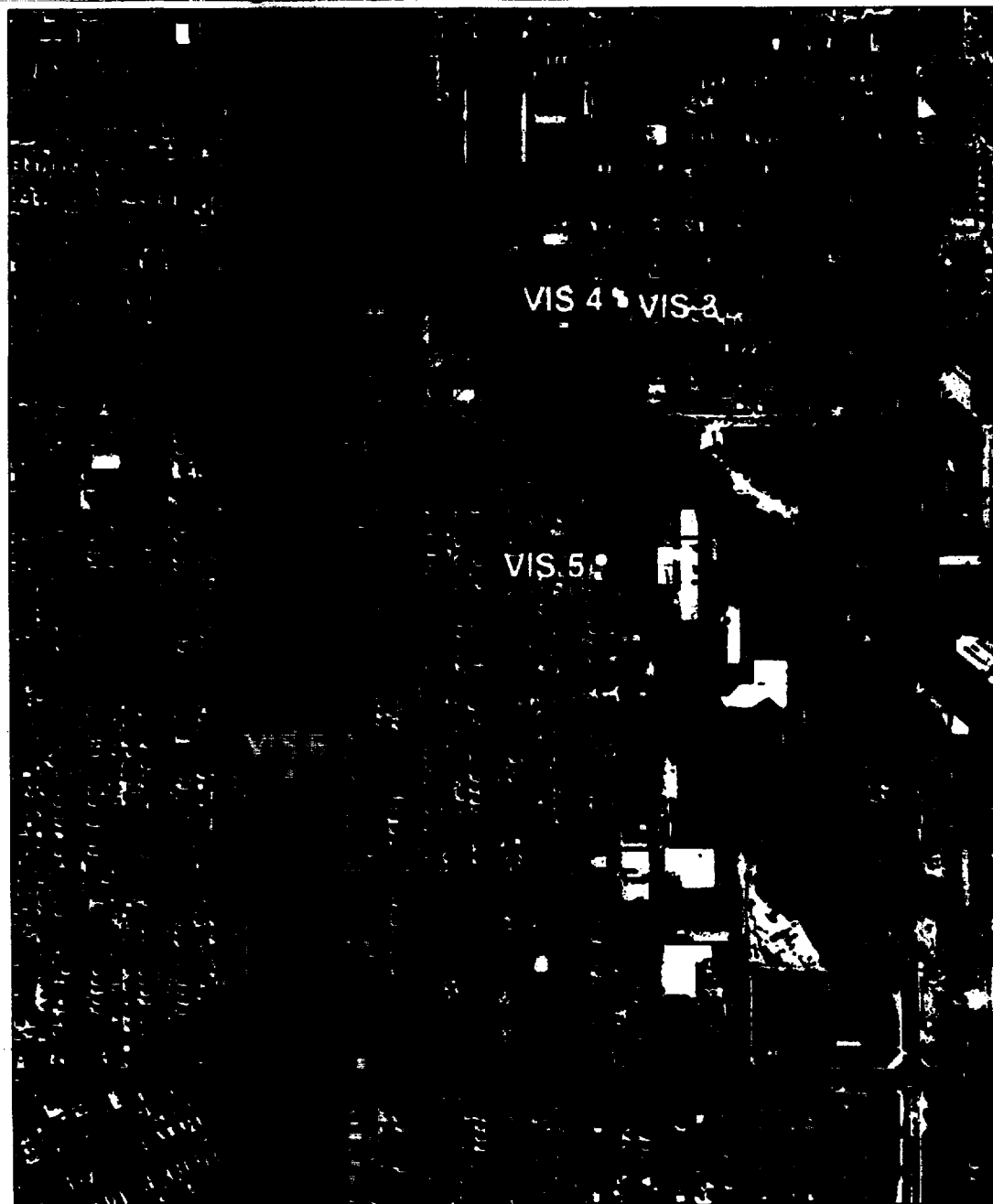
In June and July 2000, the EPA collected soil samples from alleys in the residential areas as part of the residential investigation and extent of contamination study (See Figure 1). Visible amphibole asbestos was observed and confirmed through laboratory analysis in the alleys and adjacent yards. Concentrations of asbestos as high as 95% were confirmed in samples taken from the concrete surface of the alleys. Because the Stoner Rock waste material was made readily available to the general public, EPA expects that other contaminated residences will be identified.

It has been the experience of EPA Region 8 that laboratories that were contracted to perform this analysis reported some difficulty in reading the samples due to the matrix and

**Western Mineral Co.
Vicinity of 1720 Madison Street NE
Minneapolis, Minnesota**

Legend

-  **Grab Samples
August 1-2, 2000**
-  **Grab Samples
June 20-22, 2000**
-  **Visually Inspected
August 1-2, 2000**
-  **Industrial Site**



0.2 0 0.2 0.4 Miles



**Preliminary Map
Coordinate System
UTM Zone 15, NAD 83**

**Sample Locations for August 1-2, 2000
supported by GPS Locational Data**

the long thin nature of the amphibole asbestos. As a result labs indicated that they were likely under reporting asbestos concentrations.

Asbestos is a hazardous substance as defined by 40 CFR Section 302.4 of the National Contingency Plan (NCP). Asbestos is of potential concern because chronic inhalation exposure to excessive levels of asbestos fibers suspended in air can result in lung disease such as asbestosis, mesothelioma, and lung cancer. Subacute exposures as short as a few days have been shown to cause mesothelioma. Exposures via ingestion and dermal contact are considered to be of lesser concern. Characteristics of amphibole asbestos that are of concern are in the range of greater than 5 microns in length and have an aspect ratio of greater than 5 to 1.

C. Community characteristics

The Environmental Justice (EJ) Analysis indicated that the site is located in census tract 0025, block group 1, with a population of 376. To meet the EJ concern criteria, the area within 1-mile of the site must have a population that is twice the state low income percentage and/or twice the state minority percentage. For this site, the area must be at least 54% low-income and/or at least 12% minority. At this site, the low-income percentage is 55.1%, and the minority percentage is 19.7%. Therefore this site does meet the region's EJ criteria based on demographics as identified in "Region 5 Interim Guidelines for Identifying and Addressing a Potential EJ Case, June 1998".

III. THREATS TO PUBLIC HEALTH OR WELFARE OR THE ENVIRONMENT, AND STATUTORY AND REGULATORY AUTHORITIES

A. Threats to Public Health or Welfare

The threat of exposure to residents exists through direct contact and subsequent inhalation of amphibole asbestos which is currently in the alley's and yards of residential properties around the Site. The conditions at the Site present an imminent and substantial threat to human health and the environment and meet the criteria for initiating a Removal Action under Section 300.415(b)(2) of the NCP. The following factors from §300.415(b)(2) of the NCP form the basis for EPA's determination of the threat presented, and the appropriate action to be taken:

- (i) Actual or potential exposure to nearby human populations, animals, or the food chain from hazardous substances: The large concentrations of asbestos found in the residential alley's and in surface soils in yards indicate that the human exposure

pathway exists. In evaluating the threat posed by this exposure there are several factors to consider. The first is a historic review of the effects that have been documented by exposures to similar conditions. The second is construction of an appropriate conceptual risk model to quantitatively estimate current risks.

Given the occurrences of documented cases of asbestos related disease and death associated with handling of the ore, vermiculite product, and wastes from the Western Mineral site, it is reasonable to conclude that this known exposure pathway is an imminent and substantial threat to public health and welfare. In support of this conclusion the OSC sought and received concurrent opinions from the EPA Regional Toxicologist (see Attachment 3).

(iv) High levels of hazardous substances in soils largely at or near the surface, that may migrate; Vermiculite and pieces of amphibole asbestos are visible at the surface at both the industrial site and residential sites. Surface soils at both the industrial and residential sites contain high measured asbestos levels scattered widely over the surface of the properties. There are several pathways by which these asbestos fibers can become entrained in air leading to inhalation exposures. Contaminated soils can easily be tracked into buildings or off the contaminated properties by truck, automobile, bicycle, and/or pedestrian traffic; and then through normal activities, such as vacuuming or other air disturbance, become respirable dust. Wind, particularly in dry summer months, can lead to the migration of fine asbestos fibers from contaminated surface soils. Rainfall and snow melt would also tend to wash the fibers off of the residential yards onto the adjacent alley's and to the nearby streets and sewers where they could also become airborne.

There is documentation that in the past, area residents would remove bulk waste vermiculite that had been abandoned by Grace at the industrial site to use as fill around their homes. This has resulted in the contamination of yards, driveways, and gardens with amphibole asbestos in the area around the site and possibly on residential sites in the suburbs surrounding Minneapolis. Residents and newspaper reports indicate that from the 1940's through the 1980's children in the neighborhood played in the large pile of waste vermiculite that was labeled "Free Crushed Rock" by W.R. Grace.

Currently EPA has not established, under any of its regulatory programs, an asbestos level in soil below which an exposure does not pose a risk. The 1% cut-off level for regulation under the Toxic Substances Control Act abatement program was established on the basis of analytical capability at the time, and was not established based on the level of risk represented. To the contrary, at Superfund

sites in California EPA Region IX found in certain settings that concentrations of asbestos less than 1% posed unacceptable inhalation risks when subject to disturbance by traffic (EPA, 1994).

(v) Weather conditions that may cause hazardous substances or pollutants or contaminants to migrate or be released; The warmer temperatures and dry weather typical in the summer and fall months in Minneapolis will contribute to the migration of asbestos containing soils. As soils dry out they are more likely to be transported by wind, causing the asbestos to become airborne and available for inhalation. In the spring time snow melt, rainfall, or other forms of run-off inducing events will tend to spread the contamination further from the yards to the alley's to the streets.

(vii) The (lack of) availability of other appropriate federal or state mechanisms to respond to the release; No other Local, State, or Federal agency is in the position or currently has the resources to independently implement an effective response action to address the on-going threats presented at the residential sites. EPA will conduct its actions in cooperation with State and local authorities. The Minnesota Pollution Control Agency (MPCA) is the lead oversight agency for the cleanup of the industrial site under their voluntary cleanup program.

B. Threats to the Environment

The Site investigation has not proceeded far enough to know if the asbestos contamination is a threat to animals, water, and other parts of the environment. Asbestos is primarily a threat to human health.

IV. ENDANGERMENT DETERMINATION

Asbestos is a generic term for a group of six naturally-occurring fibrous silicate minerals. The predominant fibrous nature of minerals found at the Western Mineral Products Site are of the tremolite-actinolite solid solution series (referred to in this Action Memo as amphibole asbestos). Asbestos can cause asbestosis and is a recognized human carcinogen, causing lung cancer and mesothelioma, a lethal neoplasm of the lining of the chest and abdominal cavities. All of these asbestos related diseases have been found, to an unprecedented extent among former plant workers, their families, and to nearby residents with no known occupational or family connection to the vermiculite processing operations in Minneapolis. Cancer of the larynx and esophageal lining has also been associated with exposure to asbestos. Commercial forms of asbestos have been found to be carcinogenic in experimental animals.

Actual or threatened releases of asbestos from this Site, if not addressed by implementing the response action selected in this Action Memorandum, present an imminent and substantial endangerment to public health, welfare, and the environment.

V. PROPOSED ACTIONS AND ESTIMATED COSTS

A. Proposed Actions

To mitigate the threat to the public health and welfare or the environment posed by the asbestos present on the residential properties, the proposed removal actions are outlined below. The removal will involve the following:

- a. Develop and implement a site health and safety plan;
- b. Determine the horizontal extent of asbestos contamination in the contaminated residential sites and identify areas to be remediated;
- c. Excavate and remove asbestos contaminated soils to a maximum depth of 18 inches in the yards and alley's;
- d. Dispose of contaminated soils at an EPA-approved off-site disposal facility;
- e. Remove and dispose of asbestos from the surface of the paved alley's and driveways;
- f. Perform personal air sampling and ambient air sampling during remediation activities;
- g. Implement engineering measures to control dust during the cleanup;
- h. Install a synthetic liner at the bottom of the excavated area prior to backfill;
- i. Analyze bulk asbestos samples using standard Polarized Light Microscopy (PLM) methods. Supplement PLM analysis with Transmission Electron Microscopy (TEM) for samples with lower concentrations of asbestos to assess whether contamination is present and whether sufficient excavation has occurred;
- j. Backfill excavated areas with clean soil and restore property to original pre-removal condition;

It is estimated that each residential property will take approximately an average of 1.5 days of on-site work time to remediate. This project is estimated to take 40 days to complete assuming that 30 residential properties require remediation.

For the purposes of this initial removal action, cleanups will be initiated at properties with asbestos contamination levels of 1% or greater. Surface soils with detectable levels of contamination will be removed. The excavation depth will be approximately 18 inches.

In accordance with Section 300.415(l), EPA will pursue appropriate arrangements for

post-removal site controls at the disposal site to ensure the long-term integrity of the removal. EPA has not yet made a decision regarding NPL listing for the Site. The proposed removal actions should compliment and contribute to the overall success of any remedial actions in the future.

As this cleanup is being conducted as a Time-Critical Removal Action, all Federal and State ARARs may not have been identified at this time. In accordance with the NCP, all ARARs for the Site will be attained to the extent practicable, given the scope of the project and the urgency of the situation as they are identified.

Many of the ARARS identified for these Removal Actions come from the Clean Air Act National Emission Standards for Hazardous Pollutants (NESHAPS) for asbestos. These regulations were designed specifically for renovation and demolition of buildings with asbestos containing material (ACM) such as floor tile, ceiling tile and pipe wrapping. The regulations were not designed for piles of unexpanded vermiculite, contaminated soils, or heavily contaminated dust. As such, it is anticipated that it may not be practicable to achieve all ARARS during this Removal Action.

B. Estimated Costs

The following cost estimates include costs associated with the residential removal actions for purposes of creating a total project ceiling. These costs are being estimated anticipating that the project will need to be performed as a fund lead action. The costs do not include any past or future investigation costs on the Site. Costs are projected as follows:

EXTRAMURAL COSTS

Cleanup Contractor Costs	\$ 645,000
Contingency (15%)	\$ 96,750
Subtotal	\$ 741,750
START	\$ 30,250
Extramural Subtotal	\$ 772,000
Extramural Contingency (10%)	\$ 77,200
TOTAL, EXTRAMURAL COSTS	\$ 849,200

INTRAMURAL COSTS

U.S. EPA Direct Costs \$30 x (500 Regional Hours + 50 H.Q. hours)	\$ 16,500
U.S. EPA Indirect Costs \$65 x 500 Regional Hours	\$ 32,500
TOTAL INTRAMURAL COSTS	\$ 49,000

TOTAL PROJECT CEILING **\$ 898,200**

A detailed cleanup contractor cost breakdown is available as Attachment 1.

VI. EXPECTED CHANGE IN THE SITUATION SHOULD ACTION BE DELAYED OR NOT TAKEN

Delayed action will increase public health risks to the local population/environment posed by asbestos fibers in the residential alleys and yards.

VII. OUTSTANDING POLICY ISSUES


Asbestos removals have been completed in Region 5, and around the country at numerous removal sites which were initiated under Section 300.415 of the NCP and in compliance with NESHAPS regulation under 40 CFR Section 61.150. This removal does not set a precedent or constitute a nationally significant issue. Because of the potentially broad impact of the vermiculite ore with high levels of amphibole asbestos mined from the Libby, Montana deposits, EPA Region 5 is coordinating with EPA Headquarters and other regions to assure a consistent approach to vermiculite issues.

VIII. ENFORCEMENT

For administrative purposes, information concerning the enforcement strategy for this Site is contained in the attached Enforcement Confidential Addendum.

IX. RECOMMENDATION

This decision document represents the selected initial Removal Action for the residential portion of the Western Mineral Products Site, located in Minneapolis, Hennepin County, Minnesota, developed in accordance with CERCLA as amended, and not inconsistent with the NCP. This decision is based on the Administrative Record for the Site. Conditions at the Site meet the NCP §300.415(b)(2) criteria for a Removal Action, and your approval is recommended. The total project ceiling, if approved, will be \$ 898,200. Of this, \$ 818,950 may be used for cleanup contractor costs. You may indicate your decision by signing below.

APPROVE:  Date: 7/21/00
for William E. Muno, Director
Superfund Division

DISAPPROVE: _____ Date: _____
William E. Muno, Director
Superfund Division

Attachments:

- Figure 1 - Site and Residential Sample Location Map
- Attachment 1 - Cleanup Contractor Costs
- Attachment 2 - Administrative Record Index
- Attachment 3 - EPA Toxicologist's Memorandum
- Attachment 4 - Confidential Enforcement Attachment
- Attachment 5 - Environmental Justice Analysis

cc: K. Mould, U.S. EPA HQ, 203G
D. Henne, U.S. Department of Interior, w/o Enforcement Addendum
J. Connell, Minnesota Pollution Control Agency, w/o Enforcement Addendum

Peder Larson, w/o Enforcement Addendum
Commissioner's Office
Minnesota Pollution Control Agency
520 Lafayette
St. Paul, MN 55155-4194

Rita Messing, Ph.D., w/o Enforcement Addendum
Minnesota Department of Health
121 E. 7th Place
St. Paul, MN 55101

Rodney Sando, w/o Enforcement Addendum
Commissioner's Office
500 Lafayette
St. Paul, MN 55155-4037



1



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BCC PAGE

REDACTED

NOT RELEVANT TO THE SELECTION OF THE REMOVAL ACTION

Attachment 1

Cleanup Contractor Costs

Personnel	\$ 114,000
Equipment	\$ 33,000
Disposal	\$ 84,000
Other Direct Costs	\$ 414,000
TOTAL	\$ 645,000

ATTACHMENT 2

**U.S. ENVIRONMENTAL PROTECTION AGENCY
REMOVAL ACTION**

**ADMINISTRATIVE RECORD
FOR
WESTERN MINERAL PRODUCTS SITE
MINNEAPOLIS, HENNEPIN COUNTY, MINNESOTA**

**ORIGINAL
SEPTEMBER 12, 2000**

<u>NO.</u>	<u>DATE</u>	<u>AUTHOR</u>	<u>RECIPIENT</u>	<u>TITLE/DESCRIPTION</u>	<u>PAGES</u>
1	09/11/00	Ecology and Environment, Inc.	U.S. EPA	Letter Report for the Residential Portion of the Western Mineral Products Site	118
2	00/00/00	Zintak, L., U.S. EPA	Muno, W., U.S. EPA	Action Memorandum: Request for a Time- Critical Removal Action Approval at the Western Mineral Products Site (PENDING)	



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

MEMORANDUM [9/6/2000]

SUBJECT: Exposure to amphibole asbestos fiber contamination in residential areas associated with the Western Minerals Products Site in Minneapolis, Hennepin County, Minnesota (Site ID # B5P2) poses an imminent and substantial endangerment to public health.

FROM: Mark D. Johnson Ph.D., DABT.
Regional Toxicologist

TO: Leonard N. Zintak, Jr., On-Scene Coordinator
Emergency Response Section 3

I PURPOSE

This memorandum addresses the rationale for determination of an imminent and substantial endangerment to public health posed by exposure to residual amphibole mineral fiber contamination at the former Western Minerals vermiculite processing facilities and in the residential areas containing waste material generated at the facility. The Western Mineral Products site received process vermiculite ore from the mine in Libby, MT by rail. Expansion of the raw ore occurred inside the building at 1720 Madison Street. Expansion was accomplished by heating the ore, usually in a dry kiln, to approximately 2000 of, which boiled the water trapped in the crystalline matrix of the vermiculite, thus expanding the material by a factor of 10 to 15 fold. The waste product from the expansion process, also known as "Stoner Rock," was discarded at the loading dock into a large pile on the western side of the facility. A sign indicating that "Free Crushed Rock" was available was located above the pile. Over an estimated period of 40 yrs, local residents were reported to have taken this waste stoner rock material, to be used for a variety of purposes, including garden soil conditioning, driveway and yard fill, sandbox fill material, barbeque grill additive, and indoor insulation. Analysis of soil samples collected by EPA in the area where the former piles occurred show very high concentrations (~20%) of amphibole asbestos. Bundles of this asbestos material are extremely abundant in the surface soil near the loading dock on the west side of the facility.

Mineral fibers of this solid solution series are the focus of the present EPA investigation in

Libby. Amphibole mineral fibers of the tremolite-actinolite-richterite-winchite solid solution series (figure 1, hereafter referred to as 'tremolite, amphibole, or asbestos'), have been found in the Libby ore deposit. Occupational exposure studies of mine workers in Libby have demonstrated that exposure to these tremolite solution series fibers is associated with a significant level of asbestos-related disease (asbestosis, mesothelioma, lung cancer) and death of workers and family members of workers. Investigations of former workers at the Western Minerals site have indicated a significant number of cases of asbestos-related disease. In addition, several cases of asbestos disease have been reported in individuals who had no known asbestos exposure, but played as children in the stoner rock piles at Western Minerals. Those individuals also lived immediately across the street from the facility and could also have received exposure from airborne releases from the facility. In the interest of protecting public health, I recommend that appropriate actions be initiated to reduce or eliminate exposure to mineral fibers at the Western Minerals site and residences where the waste stoner rock material may be located.

II SUMMARY OF FINDINGS:

- I) Fibrous mineral fibers found in the vicinity of the former Western Minerals site are amphibole asbestiform in habit, are of respirable size, and are known to induce lung cancer, mesothelioma, and asbestosis upon inhalation exposure.
- II The waste stoner rock material has been shown to be highly enriched for asbestos content. Locations where the waste stoner rock has been distributed are source areas for exposure to the residents. Physical disturbance of the material (e.g., driving a vehicle on a contaminated driveway surface, mowing a lawn containing this material, leaf collection activities by rake or leafblower on contaminated lawns, or wind action) can result into dispersion of asbestos fibers into the air.
- II Amphibole material, apparently originating from contaminated driveways, has been observed to be distributed on adjacent surfaces, including alleys and residential streets. This dispersion into areas with higher traffic magnifies the potential for breaking the material into smaller and smaller sizes that would be more likely to become airborne and respirable. These are areas where there may also be a greater likelihood of human contact with the asbestos material.
- II The contaminated soil and surfaces present an ongoing source of asbestos which can become entrained in air and can be transported on vehicles, pets, and shoes to homes and other areas of potential secondary human exposure.

III BACKGROUND:

Vermiculite ore bodies on Zonolite mountain are associated with tremolite ranging in concentration to nearly 100% in selected areas (W.R. Grace). Although early exploration and mining efforts by the Zonolite Company focused upon the commercial viability of fibrous amphibole deposits found on Zonolite Mountain (DOI, 1928) no commercial production of tremolite is reported. Vermiculite was discovered in the Rainy Creek Mining District of Lincoln County, Montana in 1916 by E.N. Alley. Alley formed the Zonolite Company and began commercial production of vermiculite in 1921. Another company, the Vermiculite and Asbestos Company (later known as the Universal Insulation Company), operated on the same deposits (BOM, 1953). W.R. Grace purchased the mining operations in 1963 and greatly increased production of vermiculite until 1990 when mining and milling of vermiculite ceased. During early mining operations airborne fiber concentrations at the mine exceeded 100 fibers/cc in several job classifications (Amandus et al, 1987a). Airborne fiber concentrations in the residential area of Libby exceeded the present occupational Permissible Exposure Level (PEL) of 0.1 fiber/cubic centimeter established by OSHA 1994 (MRI, 1982; Eschenbach deposition). This exposure limit is considered to be associated with significant risk (3.4 additional asbestos-related cancers per 1000 individuals as per OSHA estimates) but is the practical lower limit of detection using phase contrast microscopy (PCM) as a measurement technique (OSHA, 1994).

Amphibole mineral fibers, including tremolite, are known to cause a variety of lethal and sub-lethal health effects as discussed below. Evidence of the lethal effects of exposure to tremolite from the vermiculite ore body on Zonolite Mountain is abundant. During the 1980s Lockey et al. (1984) and then the National Institutes for Occupational Safety and Health (NIOSH) (Amandus et al., 1987) conducted investigations of tremolite exposure and the morbidity and mortality of workers in various aspects of the mining, milling and refining process. These investigations, conducted during active vermiculite mining and processing activities in Libby, MT demonstrated multiple cases of lung cancer, mesothelioma, and asbestosis in workers exposed to variable concentrations of tremolite fiber at the mine. These findings were independently confirmed by concurrent investigations conducted by MacDonald et al., (1986).

Since the cessation of vermiculite mining and processing operations in Libby, local physicians and nearby pulmonary specialists have continued to identify individuals suffering from asbestosis, lung cancer and mesothelioma as a result of exposure to tremolite mineral fibers. One pulmonologist has seen more than 250 cases of asbestos-related disease from the Libby area (Whitehouse, 2000). While 142 of these individuals are believed to have been occupationally exposed during vermiculite mining operations, 29 individuals were secondarily exposed through household contact. Eleven cases are reported to have no connection with former mining or processing activities. These estimates are derived from a single physician working in the vicinity of Libby. Actual numbers of affected individuals are unknown and may be considerably higher.

IV ENDANGERMENT RATIONALE:

The rationale for determination of an imminent and substantial endangerment from exposures at the former Western Minerals site is:

- 1) Epidemiological studies workers from the Libby vermiculite mine have demonstrated that exposure to the amphibole asbestos fibers in this vermiculite ore and processing by-products of the vermiculite ore are associated with a variety of lethal and sub lethal health effects in former workers, families of workers, and in non-occupationally exposed members of the Libby community. In addition, a significant number of former workers at the Western Minerals vermiculite exfoliation facility have developed asbestos-related disease. Also, several individuals with only childhood exposure to the waste stoner rock material at Western Minerals have developed asbestos-related disease, with at least one death.
- 2) Detection of high levels of amphibole asbestos concentration (up to 20%) in samples taken in surface and subsurface soils at the site. These fibers represent a significant source of exposure to current workers and to nearby residents as a result of air dispersion of fibers. The highest levels were detected in areas immediately across the street from residences.
- 3) Detection of high levels of amphibole asbestos concentration (up to 80%) in surface soil and dust samples taken in residential yards, driveways, alleys, and streets within one block of the facility. Complete human exposure pathways (by inhalation and ingestion) have been positively identified by personal observation and empirical measurement;
- 4) The presence of amphibole asbestos material containing fibers of respirable and carcinogenic dimensions represents a significant health threat for human exposure.

A. Health Effects of Tremolite Asbestos: *Hazard Assessment*

Fibrous minerals found in association with the Libby vermiculite are members of a solid solution series of hydrated magnesium silicates in which varying amounts of iron (Fe^{2+}), sodium (Na^+), and aluminum (Al^{3+}) can substitute for calcium and magnesium in the solid solution. The solid solution series includes tremolite $[\text{Ca}_2\text{Mg}_3(\text{Si}_4\text{O}_{22})(\text{OH})_2]$, actinolite $[\text{Ca}_2(\text{Fe}^{2+}, \text{Mg})_5(\text{Si}_4\text{O}_{22})(\text{OH})_2]$, richterite $[\text{Na}(\text{CaNa})(\text{Mg}, \text{Fe}^{2+})_3(\text{Si}_4\text{O}_{22})(\text{OH})_2]$, and winchite $[\text{NaCa}(\text{Mg}, \text{Fe}^{2+})_4\text{AlSi}_4\text{O}_{22}(\text{OH})_2]$. Collectively with other minerals such as anthophyllite and amosite, these materials are referred to as amphiboles. In their fibrous habit, as identified in the ore body on Zonolite mountain, in association with un-expanded vermiculite, and in the exfoliated or expanded vermiculite product, these materials are generally referred to as asbestos

(Eschenbach, 1983) and are capable of causing significant human morbidity and mortality upon inhalation.

Health effect associated with fiber exposure from the Libby facilities is documented in a variety of technical reports (EPA 1980; EPA 1985; EPA 1986), and peer-reviewed studies. Lockey et al. (1984) demonstrated pleural radiographic changes and pleuritic chest symptoms in occupationally exposed workers with exposure to tremolite fiber from Libby. A detailed study of occupational exposure to tremolite during vermiculite ore processing documented significant increases of non-malignant respiratory disease and lung cancer in workers (Amandus et al., 1987a; Amandus and Wheeler, 1987). In a study conducted concurrently with the NIOSH investigation, McDonald et al. (1986) determined independently that workers in the mine experienced a "serious hazard from lung cancer, pneumoconiosis, and mesothelioma" as a result of exposure to tremolite fibers associated with the vermiculite processing.

In addition to effects associated with inhalation exposure to mineral fibers several studies indicate elevated risk of gastrointestinal cancer following exposure (Seidman et al., 1986; Ehrlich et al., 1991; Gerhardsson de Verdier et al., 1992).

B. Identification of Tremolite fibers at the Western Minerals site and Surrounding Residential Area: *Exposure Assessment*

Surface soil samples were analyzed by Polarized Light Microscopy (PLM), followed by Transmission Electron Microscopy (TEM) and Energy Dispersive X-Ray Spectrometry (EDX). Analysis of the samples by Analytical results indicated a significant percentage of samples with detectable tremolite-actinolite asbestos (Table 1).

Table 1: Summary of soil samples from Western Minerals and surrounding residential area

Location	# samples taken	#samples with detectable asbestos	% asbestos	asbestos type
Industrial property	23	16 samples: >1% 5 samples: trace	1-20%	tremolite-actinolite
Residential properties	9	7 samples: >1% 2 samples: trace	6-80%	tremolite-actinolite

TEM/EDX revealed abundant amphibole fibers of the tremolite-actinolite solution series.

Elemental analysis of the fibers showed the presence of a sodium peak, consistent with the mineral Richerite that is found in the Libby vermiculite ore. Fiber dimensions (length and width) have been shown to have an important impact on fiber toxicity (Berman et al., 1995; Blake et al., 1998; Castranova, 1998; Jianping, 1999). Clearance of fibers from the lung is inhibited and fiber toxicity is significantly enhanced when fiber length is greater than approximately $8\mu\text{m}$ (Blake et al., 1998). Analysis of fiber dimensions from these samples have indicated a significant proportion of fibers greater than $5\mu\text{m}$ in length and aspect ratios (length to width) of 10-20:1.

The collection of residential samples focused on areas where the waste stoner rock was distributed for a variety of purposes. Analysis of this material indicates that it is highly enriched for amphibole asbestos, compared to vermiculite ore or the finished vermiculite insulation product. These samples were taken from areas such as yards, driveways, and alleys where there would be frequent human exposure. It would be expected that children would have an even greater exposure due to the nature of their recreational activities. Children are especially susceptible to mesothelioma due to their longer life expectancy relative to the latency of the disease (EPA, 1986).

The route of exposure that represents the greatest health concern is the inhalation of airborne fibers, dispersed from soil or concrete surfaces by the action of pedestrian or vehicular traffic, or by wind dispersion. Several measurements have been made to estimate air concentrations resulting from the handling of asbestos-contaminated soils and bulk materials, and may serve as a basis for estimating the potential air dispersion of asbestos fibers in the stoner rock in residential areas. Addison et al., (1988) generated airborne dust clouds from mixtures of soil containing asbestos concentrations from 1 to 0.001% by weight. Dust concentrations were maintained at 5 mg/M^3 for 4 hours prior to measurement of airborne asbestos. The results indicated that, even the lowest soil asbestos concentrations (0.001%) were able to produce airborne asbestos concentrations which greatly exceed recommended human exposure limits. A similar investigation conducted by EPA (1994) indicated the likelihood of elevated airborne asbestos concentrations as a result of vehicular traffic along roadways constructed of serpentine rock. Though more realistic than the Addison study in terms of human exposure, the results of the EPA investigation also indicated significant risks associated with vehicle traffic along roadways containing 0.006 weight percent asbestos by TEM analysis.

In addition to the dispersion of fibers into the air, the frictional forces of foot and vehicular traffic on these surfaces would be expected to facilitate the breakdown of the amphibole asbestos bundles into smaller and more respirable fibers over time.

V CONCLUSION:

One of the main concerns about asbestos fiber exposure is that the dose is cumulative. Fibers of the dimensions identified in these samples have characteristics indicating that when inhaled they will penetrate deep into lung tissue and will persist due to their low clearance rate from the lungs. Studies have shown that tremolite asbestos is more stable than other forms of asbestos, which will further contribute to the accumulation of fibers in lung tissue. Children exposed to these fibers are of greatest risk due to the relatively long latency period for the asbestos-associated diseases, asbestosis, lung cancer and mesothelioma.

Unlike chemicals that can degrade in the environment, asbestos fibers from this material will persist and will continue to be generated due the presence of the relatively large mass of amphibole bundles. This evidence clearly indicates that the amphibole asbestos material in the residential soil at these locations is of a significant mass and fiber characteristics to pose an imminent and substantial threat to public health.

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ATTACHMENT 4

ENFORCEMENT CONFIDENTIAL ADDENDUM

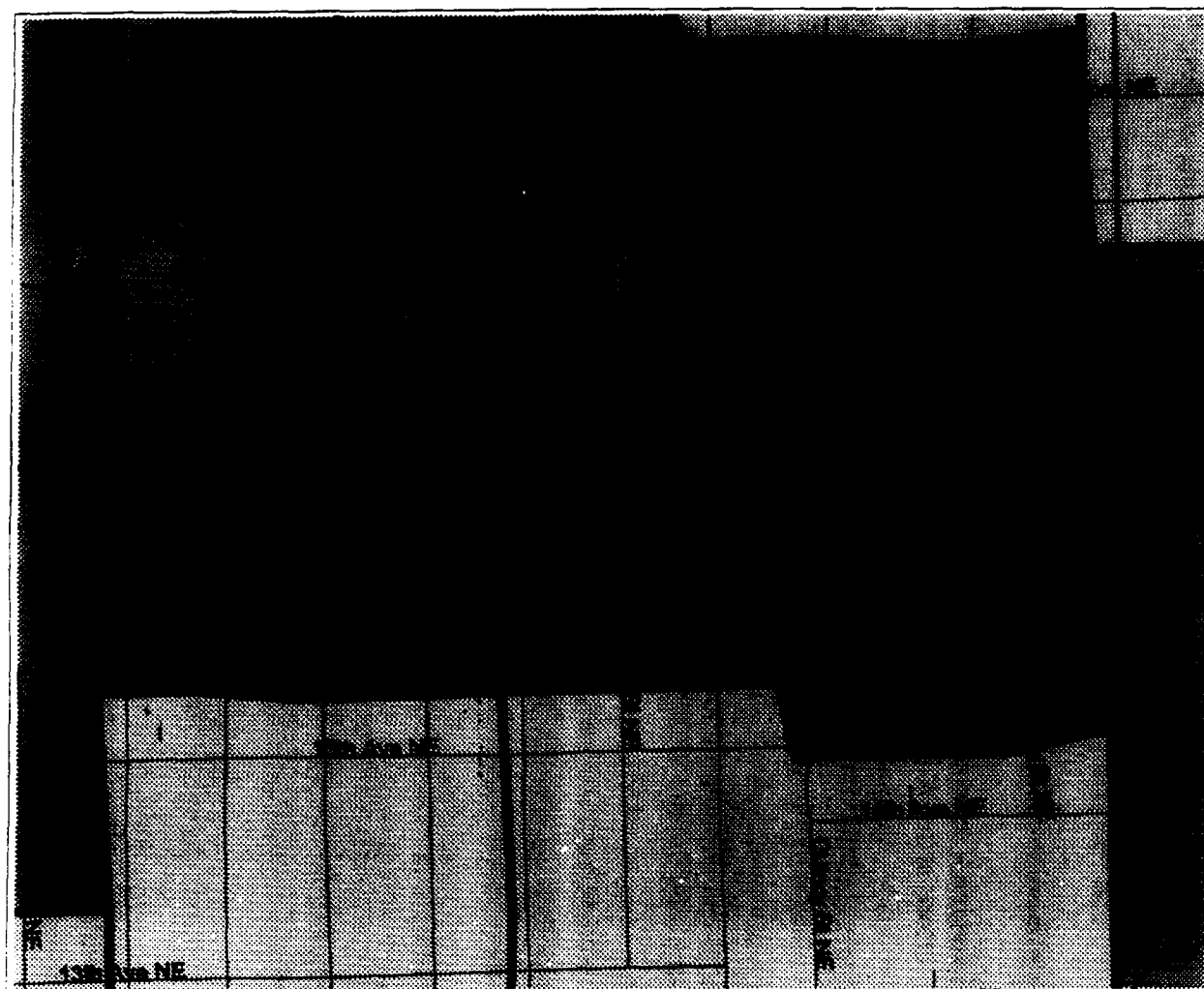
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


NOT RELEVANT TO THE SELECTION OF THE REMOVAL ACTION

Region 5 Superfund EJ Analysis

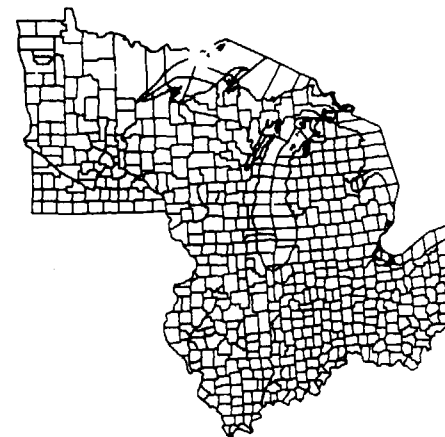
Western Mineral Products Site Minneapolis, MN



EJ Identification

-  Low Income and Minority Less than State Average
-  Low Income or Minority at or Greater than State Average
-  Low Income or Minority 2 Times or Greater than State Average
[meets Region 5 EJ Case criteria]
-  Site Location
-  Block Group Boundary

Region 5 EJ Case Criteria for Minnesota
Minority: 12% or greater
Low Income: 54% or greater



0 0.1 0.2 0.3 0.4 0.5 Miles

U.S. EPA, Region 5
Superfund Division

Date of Map 08/24/00

Source of Map: 1990 Census Database

FROM

(TUE) 10:17:00 3:26/ST. 0:26/NO. 1260706200 P 2



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

OFFICE OF
SOLID WASTE AND EMERGENCY
RESPONSE

September 26, 2000

MEMORANDUM

SUBJECT: Request for Concurrence in a Time-Critical Removal
Action at the Western Mineral Products Site in
Minneapolis, Hennepin County, Minnesota
(Site ID # B5P2)

FROM: Larry G. Reed, Acting Director
Office of Emergency and Remedial Response

Paul F. Haden
(for)

TO: Timothy Fields, Jr.
Assistant Administrator

We recently received the attached Action Memo from Region 5 for the Western Minerals Products site. The Action Memo describes the extent of contamination and potential for exposure, the establishment of a hazard for asbestos, and the planned actions. This site received vermiculite ore that was shipped from the mine in Libby, Montana. Given the association with the vermiculite ore from Libby, Montana, there has been extensive coordination between OERR and the Region on this site. Our review indicates that the action taken is consistent with other asbestos cleanups. I recommend you concur in Region 5's request.

Attachment

Concur:

Timothy Fields, Jr.

Date:

10/10/00

Non-Concur:

Date:

cc: Rick Karl, EPA Region 5

ATTACHMENT 3



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590
JUL 27 2001

REPLY TO THE ATTENTION OF: SE-5J

AMENDED ACTION MEMORANDUM

DATE:

SUBJECT: Amended Action Memo for Phase II of the Time-Critical Removal Action at the Western Mineral Products Site in Minneapolis, Hennepin County, Minnesota (Site ID # B5P2).

FROM: Sonia R. Vega, On-Scene Coordinator
Emergency Response Section 3

TO: William E. Muno, Director
Superfund Division

THRU: Richard C. Karl, Chief *R. Karl for*
Emergency Response Branch

I. PURPOSE

The purpose of this Memorandum is to request and document approval to conduct Phase II of the time-critical removal action at the residential component of Western Mineral Products Site (the Site), located in Minneapolis, Hennepin County, Minnesota. The initial action memorandum dated September 21, 2000, copy enclosed, committed \$898,200 of which up to \$410,000 were expended during Phase I of the clean up.

II. SITE CONDITIONS AND BACKGROUND

CERCLIS ID # MNN 000 508 056

A. Site Description and Background

Refer to the initial Action Memorandum dated September 21, 2000, attached.



Printed on Recycled Paper

B. Actions to Date and Current Situation

As authorized by the Action Memorandum dated September 21, 2000, as of November 10, 2000, US EPA completed the following:

1. Development and implementation of a site specific health and safety plan;
2. Conducted outreach activities including a house-to-house survey and inspection within approximately a 1/4 mile radius from the industrial plant;
3. Established a hotline, and conducted community public meetings for citizen to report possible asbestos contamination;
4. Conducted visual inspection at 323 residential properties for the presence of vermiculite processing waste products;
5. Vacuumed asbestos contaminated materials from 16 alleys/driveways;
6. Excavated asbestos contamination at, and fully restored 9 residential properties;
7. Excavated asbestos contamination at 12 additional homes that might required further excavation/restoration during Phase II. Areas excavated at these properties were completely restored;
8. Identified another 21 properties requiring clean up work. These properties were not addressed during Phase I due to inclement weather conditions;
9. Identified 5 residential properties that require further evaluation, sampling, to determine the presence of asbestos contamination.

C. Phase II

During Phase II, U.S. EPA will continue to mitigate the threat to public health and the environment posed by the presence of asbestos contamination on residential properties surrounding the Western Minerals plant. US E.P.A. will continue the removal action addressed on the September 21, 2000 Action Memorandum, and all the necessary ancillary and supporting activities.

In addition, a more aggressive public outreach is planned as part of Phase II activities in order to identify any other residential properties containing asbestos contamination.

III. THREATS TO PUBLIC HEALTH OR WELFARE OR THE ENVIRONMENT, AND STATUTORY AND REGULATORY AUTHORITIES

Threats do not differ from those discussed in the original Action Memorandum dated September 21, 2000, attached.

IV. ENDANGERMENT DETERMINATION

Actual or threatened releases of asbestos fibers due to the presence of asbestos containing materials at the residential properties, may present an imminent and substantial endangerment to public health, welfare, or the environment if not addressed by implementing the continued response actions selected in both this and the original Action Memorandum.

V. PROPOSED ACTIONS AND ESTIMATED COSTS

A. Proposed Actions

To mitigate the threat to the public health and welfare or the environment posed by the asbestos present on the residential properties, the proposed removal actions, outlined on the original action memorandum prepared for Phase I, are outlined below. The removal will involve the following:

- i. Develop and implement a site health and safety plan;
- ii. Determine the horizontal extent of asbestos contamination in the contaminated residential sites and identify areas to be remediated;
- iii. Excavate and remove asbestos contaminated soils to a maximum depth of 18 inches in the yards and alleys;
- iv. Dispose of contaminated soils at an EPA-approved off-site disposal facility;
- v. Remove and dispose of asbestos from the surface of the paved alleys and driveways;
- vi. Perform personal air sampling and ambient air sampling during remediation activities;
- vii. Implement engineering measures to control dust during the cleanup;
- viii. Install a synthetic liner at the bottom of the excavated area prior to backfill;
- ix. Analyze bulk asbestos samples using standard Polarized Light Microscopy (PLM) methods. Supplement PLM analysis with Transmission Electron Microscopy (TEM) for samples with lower concentrations of asbestos to assess whether contamination is present and whether sufficient excavation has occurred;
- x. Backfill excavated areas with clean soil and restore property to original pre-removal condition;

It is estimated that each residential property will take approximately an average of 1.5 days of on-site work time to remediate. At this point is hard to estimate the duration of

the project. In addition to the 23 residential properties addressed during Phase I, about 21 more were identified for clean up. This task is estimated to take 40 days to complete assuming that no more residential properties are identified which require remediation. Given the intense community outreach been planned for this Phase II, it is expected that more residential properties will be identified for clean up, which makes it difficult to predict, at this time, how long this phase of the project is going to take.

For the purposes of this Phase II removal actions, cleanups will take place at properties where significant visible asbestos contamination is present and those where a surface sample collected from the property indicates significant asbestos content, even if there is no visible contamination.

B. Estimated Costs

The following cost estimates include costs associated with Phase II of the residential removal actions for purposes of creating a total project ceiling. These costs are being estimated based on the costs incurred during Phase I. The costs do not include any past costs. Costs are projected as follows:

EXTRAMURAL COSTS

Cleanup Contractor Costs	\$ 242,040
Contingency (15%)	\$ 36,306
Subtotal	\$ 278,346
START	\$ 58,800
Extramural Subtotal	\$ 337,146
Extramural Contingency (10%)	\$ 33,715
TOTAL, EXTRAMURAL COSTS	\$ 370,861

INTRAMURAL COSTS

U.S. EPA Direct Costs \$30 x (850 Regional Hours + 70 H.Q. hours)	\$ 27,600
U.S. EPA Indirect Costs \$65 x 850 Regional Hours	\$ 55,250
TOTAL INTRAMURAL COSTS	\$ 82,850
 TOTAL	 \$ 453,711

A detailed cleanup contractor cost breakdown is available as Attachment 1.

VI. EXPECTED CHANGE IN THE SITUATION SHOULD ACTION BE DELAYED OR NOT TAKEN

Delayed action will increase public health risks to the local population/environment posed by asbestos fibers in the residential alleys and yards.

VII. OUTSTANDING POLICY ISSUES

Asbestos removals have been completed in Region 5, and around the country at numerous removal sites which were initiated under Section 300.415 of the NCP and in compliance with NESHAPS regulation under 40 CFR Section 61.150. This removal does not set a precedent or constitute a nationally significant issue. Because of the potentially broad impact of the vermiculite ore with high levels of amphibole asbestos mined from the Libby, Montana deposits, EPA Region 5 is coordinating with EPA Headquarters and other regions to assure a consistent approach to vermiculite issues.

VIII. ENFORCEMENT

For administrative purposes, information concerning the enforcement strategy for this Site is contained in the attached Enforcement Confidential Addendum.

IX. RECOMMENDATION

This decision document represents the Phase II Removal Action for the residential portion of the Western Mineral Products Site, located in Minneapolis, Hennepin County, Minnesota, developed in accordance with CERCLA as amended, and not inconsistent with the NCP. This decision is based on the Administrative Record for the Site. Conditions at the Site meet the NCP §300.415(b)(2) criteria for a Removal Action, and your approval is recommended. These actions under Phase II will reach total project ceiling, approved on September 21, 2000. You may indicate your decision by signing below.

APPROVE: _____

William E. Muno
William E. Muno, Director
Superfund Division

Date: _____

7/27/01

DISAPPROVE: _____

William E. Muno, Director
Superfund Division

Date: _____

Attachments:

- Attachment 1 - Action Memorandum, September 21, 2000
- Attachment 2 - Cleanup Contractor Costs

cc: C. Stanton, U.S. EPA HQ, 203G
D. Henne, U.S. Department of Interior, **w/o Enforcement Addendum**
J. Connell, Minnesota Pollution Control Agency, **w/o Enforcement Addendum**
Karen Studders, **w/o Enforcement Addendum**
Commissioner's Office
Minnesota Pollution Control Agency
520 Lafayette
St. Paul, MN 55155-4194

Rita Messing, Ph.D., **w/o Enforcement Addendum**
Minnesota Department of Health
121 E. 7th Place
St. Paul, MN 55101

Rodney Sando, **w/o Enforcement Addendum**
Commissioner's Office
500 Lafayette
St. Paul, MN 55155-4037

BCC PAGE

WESTERN MINERAL PRODUCTS SITE

**HAS BEEN REDACTED
(1 PAGE)**



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

SEP 21 2000

REPLY TO THE ATTENTION OF SE-5J

ACTION MEMORANDUM

SUBJECT: Request for a Time-Critical Removal Action approval at the Western Mineral Products Site in Minneapolis, Hennepin County, Minnesota (Site ID # B5P2).

FROM: Leonard N. Zintak, Jr., On-Scene Coordinator
Emergency Response Section 3

TO: William E. Muno, Director
Superfund Division

THRU: Richard C. Karl, Chief
Emergency Response Branch

I. PURPOSE

The purpose of this action memorandum is to request and document approval to expend up to \$898,200 to conduct a time-critical removal action at the Western Mineral Products Site located in Minneapolis, Hennepin County, Minnesota. Specifically, the proposed removal action will address the contaminated residential properties surrounding the industrial portion of the site.

This removal action addresses the need to mitigate the threats to the local population and the environment posed by fibrous amphibole asbestos that was released into the environment from the industrial portion of the site as a result of the processing of vermiculite ore and disposal of associated waste products. High concentrations of amphibole asbestos posing a public health threat have been detected on and in the areas surrounding the former Western Mineral Products/W.R. Grace property and on the adjacent Electramatic property. These properties are herein referred to as the industrial sites. Also, high concentrations of amphibole asbestos have been detected in the residential areas (residential sites) surrounding the industrial sites.

The proposed removal action will address immediate health threats identified in the residential areas during EPA's sampling in Northeast Minneapolis which occurred from March through



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August 2000. EPA plans to conduct further sampling at the residential sites which surround the industrial site and in other areas that may have been impacted by the vermiculite processing operations at the Site. This subsequent sampling, analysis and evaluation may identify additional time-critical threats at other residential sites.

This site is not on the National Priorities List (NPL).

II. SITE CONDITIONS AND BACKGROUND

CERCLIS ID # MNN 000 508 056

A. Site Description and Background

The industrial sites are located at 1720 Madison Street N.E. and 1815 Jefferson Street N.E., Minneapolis, Hennepin County, Minnesota, and are bordered on the east by Burlington Northern Santa Fe railroad tracks, on the north by commercial buildings and west by residential properties and a city maintenance facility, and on the south by a commercial building.

The industrial sites consist of two parcels of land, one currently owned by Madison Complex, Inc. and the other currently owned by Electramatic, Inc. The site is occupied by a three-story brick office building, a brick warehouse structure, two four-story silos, and the Electramatic building to the north. The remaining portions of the industrial sites are parking lots and an abandoned section of 18th Street that divides the two parcels of land. The abandoned section of 18th Street is now owned by Electramatic and Madison Complex.

Western Mineral Products Company, a Minnesota company, operated at 1720 Madison Street N.E. as an independent company from 1946 to 1966. During part of this time it was a licensee of the Zonolite Company, a Montana Company. W.R. Grace acquired the Zonolite Company through a merger on April 16, 1963. The property at 1720 Madison was sold by W.R. Grace to Madison Complex, Inc. on October 24, 1989 by deed dated September 29, 1989. Allegedly, in 1990, W.R. Grace removed all materials that were stored in the two silos. The property at 1720 Madison is currently leased to Panel Specialties, Inc.(PSI), which manufactures prison furniture and security equipment on the property.

The Western Mineral Products Site at 1720 Madison Street N.E. processed vermiculite

ore that was shipped from the mine in Libby, Montana. The vermiculite ore body in Libby, Montana also contained amphibole asbestos fibers of the tremolite-actinolite-richterite-winchite solid solution series (herein referred to as amphibole asbestos) (Bureau of Mines Monograph, 1928). Unlike the commercially exploited chrysotile asbestos, the tremolite-actinolite material has never been used commercially on a wide scale, and for most of the mine's operating life was considered a contaminant. The commercially exploited vermiculite was used in a variety of insulation products and construction materials, as a carrier for fertilizer and other agricultural chemicals, and as a soil conditioner.

At the mine in Libby, Montana, the vermiculite ore was strip mined using conventional equipment and then processed in an on-site dry mill to remove waste rock and overburden. Once beneficiated, the processed ore was trucked to a screening plant, which separated the milled ore into five size ranges for use in various products. From there, the material was shipped across the country, predominantly by rail, for either direct inclusion in products, or for expansion (also known as exfoliation) prior to use in products.

The Western Mineral Products site in Minneapolis, Minnesota received Libby ore by rail. Expansion of the raw ore occurred inside the building at 1720 Madison Street. Expansion was accomplished by heating the ore, usually in a dry kiln, to approximately 2000 °F, which boiled the water trapped in the crystalline matrix of the vermiculite, thus expanding the material by a factor of 10 to 15 fold. The waste product from the expansion process contained high concentrations of amphibole asbestos. This waste product, also known as "Stoner Rock", was placed outside the building in a pile and was labeled as "Free Crushed Rock". The residents in the neighborhood were encouraged to take the waste material to use as fill on their properties. Residents hauled the "Free Crushed Rock" to their homes in their pickup trucks and cars. Allegedly the asbestos contaminated material was placed in yards, gardens, sandboxes, and barbeque grills. This practice may have occurred for more than 40 years.

B. Removal Site Assessment

Between February and August 2000, the U.S. EPA Emergency Response Branch conducted site assessment activities to determine the potential health threat posed by amphibole asbestos-containing wastes which were produced at the former Western Mineral Products/W.R.Grace facility at 1720 Madison and deposited outside the plant and on residential properties in the surrounding neighborhood.

As part of a national evaluation of facilities that received vermiculite ore from the Libby,

Montana mine, the U.S. Environmental Protection Agency (EPA) Region 5 Emergency Response Branch conducted an initial site visit on February 2, 2000. The initial investigation consisted of a brief inspection and sampling of the former processing building and property, and interviews with State and local officials and some members businesses operating in the area.

During the investigation EPA observed exfoliated vermiculite insulation inside the building in a ceiling area on the first floor. Also, there was visible vermiculite in the surface soils around the building. Samples were collected from these areas and were analyzed using polarized light microscopy (PLM) and transmission electron microscopy (TEM). These samples indicated trace amounts of asbestos at concentrations less than 1% by visual estimate. On April 13, 2000, U.S. EPA returned to the site to perform additional of the surface soil and indoor insulation. While the indoor samples did not detect any asbestos, the three soil samples indicated levels between 2 % and 20 % asbestos. This finding triggered additional investigatory work and also a public meeting at the nearby armory in Northeast Minneapolis on April 13, 2000. At public meeting the local residents and the news media were updated on the national and local investigation of the vermiculite sites associated with the Libby, Montana mine. At the public meeting many residents expressed their concern with the adverse health effects associated with the Western Mineral Products site. Many of the former workers from the Site have contracted asbestosis or mesothelioma, both asbestos-related diseases.

These findings led EPA to initiate a residential property investigation with the following goals:





1. Visually identify asbestos contamination in alleys and yards;
2. Sample and analyze residential areas for asbestos;
3. Conduct door-to-door community outreach to determine the extent of contamination in the residential areas around the site.

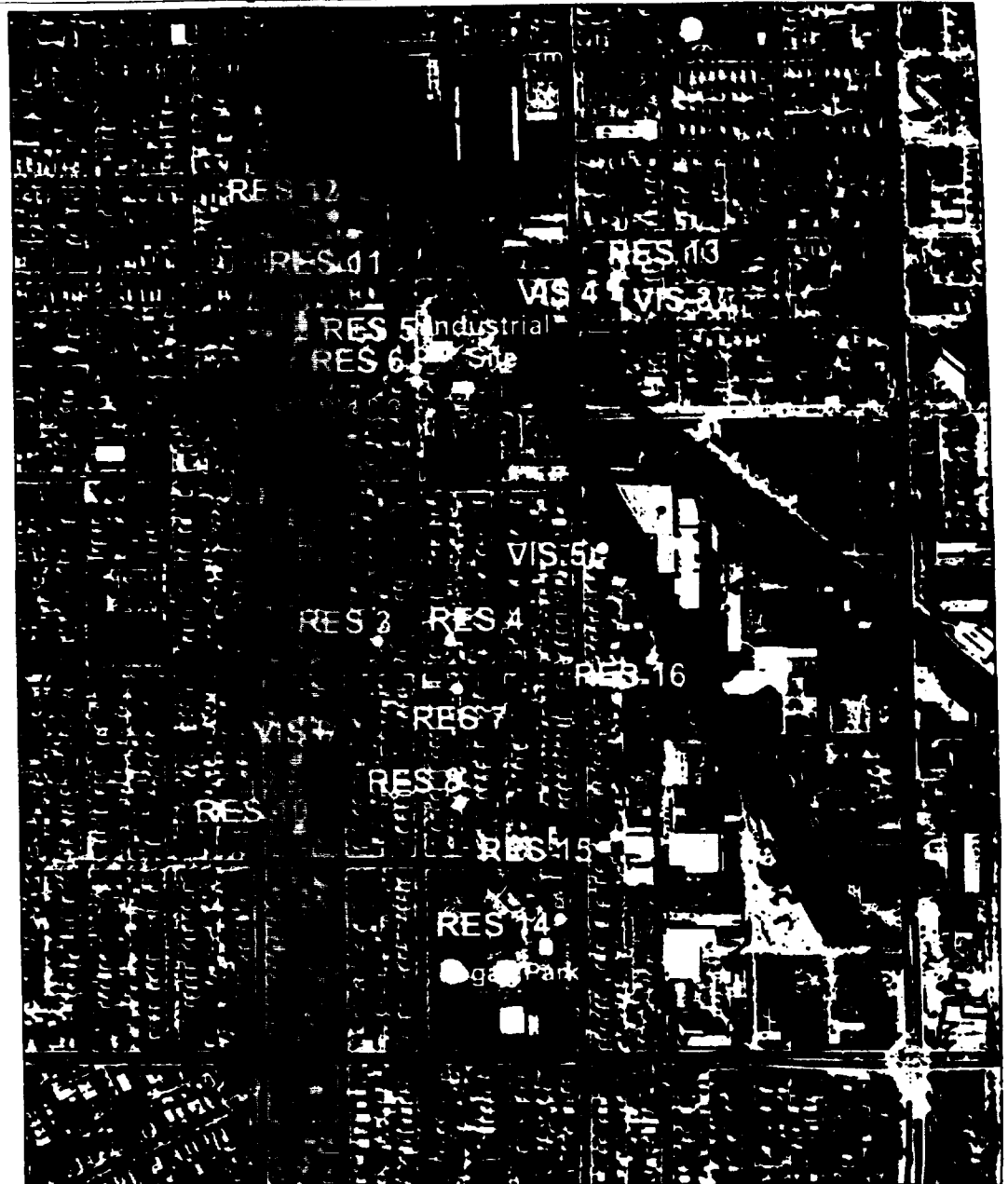
In June and July 2000, the EPA collected soil samples from alleys in the residential areas as part of the residential investigation and extent of contamination study (See Figure 1). Visible amphibole asbestos was observed and confirmed through laboratory analysis in the alleys and adjacent yards. Concentrations of asbestos as high as 95% were confirmed in samples taken from the concrete surface of the alleys. Because the Stoner Rock waste material was made readily available to the general public, EPA expects that other contaminated residences will be identified.

It has been the experience of EPA Region 8 that laboratories that were contracted to perform this analysis reported some difficulty in reading the samples due to the matrix and

Vicinity of 1720 Madison Street NE Minneapolis, Minnesota

Legend

-  Grab Samples
August 1-2, 2000
-  Grab Samples
June 20-22, 2000
-  Visually Inspected
August 1-2, 2000
-  Industrial Site



0.2 0 0.2 0.4 Miles



**Preliminary Map
Coordinate System
UTM Zone 15, NAD 83**

**Sample Locations for August 1-2, 2000
supported by GPS Locational Data**

the long thin nature of the amphibole asbestos. As a result labs indicated that they were likely under reporting asbestos concentrations.

Asbestos is a hazardous substance as defined by 40 CFR Section 302.4 of the National Contingency Plan (NCP). Asbestos is of potential concern because chronic inhalation exposure to excessive levels of asbestos fibers suspended in air can result in lung disease such as asbestosis, mesothelioma, and lung cancer. Subacute exposures as short as a few days have been shown to cause mesothelioma. Exposures via ingestion and dermal contact are considered to be of lesser concern. Characteristics of amphibole asbestos that are of concern are in the range of greater than 5 microns in length and have an aspect ratio of greater than 5 to 1.

C. Community characteristics

The Environmental Justice (EJ) Analysis indicated that the site is located in census tract 0025, block group 1, with a population of 376. To meet the EJ concern criteria, the area within 1-mile of the site must have a population that is twice the state low income percentage and/or twice the state minority percentage. For this site, the area must be at least 54% low-income and/or at least 12% minority. At this site, the low-income percentage is 55.1%, and the minority percentage is 19.7%. Therefore this site does meet the region's EJ criteria based on demographics as identified in "Region 5 Interim Guidelines for Identifying and Addressing a Potential EJ Case, June 1998".

III. THREATS TO PUBLIC HEALTH OR WELFARE OR THE ENVIRONMENT, AND STATUTORY AND REGULATORY AUTHORITIES

A. Threats to Public Health or Welfare

The threat of exposure to residents exists through direct contact and subsequent inhalation of amphibole asbestos which is currently in the alley's and yards of residential properties around the Site. The conditions at the Site present an imminent and substantial threat to human health and the environment and meet the criteria for initiating a Removal Action under Section 300.415(b)(2) of the NCP. The following factors from §300.415(b)(2) of the NCP form the basis for EPA's determination of the threat presented, and the appropriate action to be taken:

- (i) Actual or potential exposure to nearby human populations, animals, or the food chain from hazardous substances: The large concentrations of asbestos found in the residential alley's and in surface soils in yards indicate that the human exposure

pathway exists. In evaluating the threat posed by this exposure there are several factors to consider. The first is a historic review of the effects that have been documented by exposures to similar conditions. The second is construction of an appropriate conceptual risk model to quantitatively estimate current risks.

Given the occurrences of documented cases of asbestos related disease and death associated with handling of the ore, vermiculite product, and wastes from the Western Mineral site, it is reasonable to conclude that this known exposure pathway is an imminent and substantial threat to public health and welfare. In support of this conclusion the OSC sought and received concurrent opinions from the EPA Regional Toxicologist (see Attachment 3).

(iv) High levels of hazardous substances in soils largely at or near the surface, that may migrate; Vermiculite and pieces of amphibole asbestos are visible at the surface at both the industrial site and residential sites. Surface soils at both the industrial and residential sites contain high measured asbestos levels scattered widely over the surface of the properties. There are several pathways by which these asbestos fibers can become entrained in air leading to inhalation exposures. Contaminated soils can easily be tracked into buildings or off the contaminated properties by truck, automobile, bicycle, and/or pedestrian traffic; and then through normal activities, such as vacuuming or other air disturbance, become respirable dust. Wind, particularly in dry summer months, can lead to the migration of fine asbestos fibers from contaminated surface soils. Rainfall and snow melt would also tend to wash the fibers off of the residential yards onto the adjacent alley's and to the nearby streets and sewers where they could also become airborne.

There is documentation that in the past, area residents would remove bulk waste vermiculite that had been abandoned by Grace at the industrial site to use as fill around their homes. This has resulted in the contamination of yards, driveways, and gardens with amphibole asbestos in the area around the site and possibly on residential sites in the suburbs surrounding Minneapolis. Residents and newspaper reports indicate that from the 1940's through the 1980's children in the neighborhood played in the large pile of waste vermiculite that was labeled "Free Crushed Rock" by W.R.Grace.

Currently EPA has not established, under any of its regulatory programs, an asbestos level in soil below which an exposure does not pose a risk. The 1% cut-off level for regulation under the Toxic Substances Control Act abatement program was established on the basis of analytical capability at the time, and was not established based on the level of risk represented. To the contrary, at Superfund

sites in California EPA Region IX found in certain settings that concentrations of asbestos less than 1% posed unacceptable inhalation risks when subject to disturbance by traffic (EPA, 1994).

(v) Weather conditions that may cause hazardous substances or pollutants or contaminants to migrate or be released; The warmer temperatures and dry weather typical in the summer and fall months in Minneapolis will contribute to the migration of asbestos containing soils. As soils dry out they are more likely to be transported by wind, causing the asbestos to become airborne and available for inhalation. In the spring time snow melt, rainfall, or other forms of run-off inducing events will tend to spread the contamination further from the yards to the alley's to the streets.

(vii) The (lack of) availability of other appropriate federal or state mechanisms to respond to the release; No other Local, State, or Federal agency is in the position or currently has the resources to independently implement an effective response action to address the on-going threats presented at the residential sites. EPA will conduct its actions in cooperation with State and local authorities. The Minnesota Pollution Control Agency (MPCA) is the lead oversight agency for the cleanup of the industrial site under their voluntary cleanup program.

B. Threats to the Environment

The Site investigation has not proceeded far enough to know if the asbestos contamination is a threat to animals, water, and other parts of the environment. Asbestos is primarily a threat to human health.

IV. ENDANGERMENT DETERMINATION

Asbestos is a generic term for a group of six naturally-occurring fibrous silicate minerals. The predominant fibrous nature of minerals found at the Western Mineral Products Site are of the tremolite-actinolite solid solution series (referred to in this Action Memo as amphibole asbestos). Asbestos can cause asbestosis and is a recognized human carcinogen, causing lung cancer and mesothelioma, a lethal neoplasm of the lining of the chest and abdominal cavities. All of these asbestos related diseases have been found, to an unprecedented extent among former plant workers, their families, and to nearby residents with no known occupational or family connection to the vermiculite processing operations in Minneapolis. Cancer of the larynx and esophageal lining has also been associated with exposure to asbestos. Commercial forms of asbestos have been found to be carcinogenic in experimental animals.

Actual or threatened releases of asbestos from this Site, if not addressed by implementing the response action selected in this Action Memorandum, present an imminent and substantial endangerment to public health, welfare, and the environment.

V. PROPOSED ACTIONS AND ESTIMATED COSTS

A. Proposed Actions

To mitigate the threat to the public health and welfare or the environment posed by the asbestos present on the residential properties, the proposed removal actions are outlined below. The removal will involve the following:

- a. Develop and implement a site health and safety plan;
- b. Determine the horizontal extent of asbestos contamination in the contaminated residential sites and identify areas to be remediated;
- c. Excavate and remove asbestos contaminated soils to a maximum depth of 18 inches in the yards and alley's;
- d. Dispose of contaminated soils at an EPA-approved off-site disposal facility;
- e. Remove and dispose of asbestos from the surface of the paved alley's and driveways;
- f. Perform personal air sampling and ambient air sampling during remediation activities;
- g. Implement engineering measures to control dust during the cleanup;
- h. Install a synthetic liner at the bottom of the excavated area prior to backfill;
- i. Analyze bulk asbestos samples using standard Polarized Light Microscopy (PLM) methods. Supplement PLM analysis with Transmission Electron Microscopy (TEM) for samples with lower concentrations of asbestos to assess whether contamination is present and whether sufficient excavation has occurred;
- j. Backfill excavated areas with clean soil and restore property to original pre-removal condition;

It is estimated that each residential property will take approximately an average of 1.5 days of on-site work time to remediate. This project is estimated to take 40 days to complete assuming that 30 residential properties require remediation.

For the purposes of this initial removal action, cleanups will be initiated at properties with asbestos contamination levels of 1% or greater. Surface soils with detectable levels of contamination will be removed. The excavation depth will be approximately 18 inches.

In accordance with Section 300.415(l), EPA will pursue appropriate arrangements for

post-removal site controls at the disposal site to ensure the long-term integrity of the removal. EPA has not yet made a decision regarding NPL listing for the Site. The proposed removal actions should compliment and contribute to the overall success of any remedial actions in the future.

As this cleanup is being conducted as a Time-Critical Removal Action, all Federal and State ARARs may not have been identified at this time. In accordance with the NCP, all ARARs for the Site will be attained to the extent practicable, given the scope of the project and the urgency of the situation as they are identified.

Many of the ARARS identified for these Removal Actions come from the Clean Air Act National Emission Standards for Hazardous Pollutants (NESHAPS) for asbestos. These regulations were designed specifically for renovation and demolition of buildings with asbestos containing material (ACM) such as floor tile, ceiling tile and pipe wrapping. The regulations were not designed for piles of unexpanded vermiculite, contaminated soils, or heavily contaminated dust. As such, it is anticipated that it may not be practicable to achieve all ARARS during this Removal Action.

B. Estimated Costs

The following cost estimates include costs associated with the residential removal actions for purposes of creating a total project ceiling. These costs are being estimated anticipating that the project will need to be performed as a fund lead action. The costs do not include any past or future investigation costs on the Site. Costs are projected as follows:

EXTRAMURAL COSTS

Cleanup Contractor Costs	\$ 645,000
Contingency (15%)	\$ 96,750
Subtotal	\$ 741,750
START	\$ 30,250
Extramural Subtotal	\$ 772,000
Extramural Contingency (10%)	\$ 77,200
TOTAL, EXTRAMURAL COSTS	\$ 849,200

INTRAMURAL COSTS

U.S. EPA Direct Costs \$30 x (500 Regional Hours + 50 H.Q. hours)	\$ 16,500
U.S. EPA Indirect Costs \$65 x 500 Regional Hours	\$ 32,500
TOTAL INTRAMURAL COSTS	\$ 49,000
 TOTAL PROJECT CEILING	 \$ 898,200

A detailed cleanup contractor cost breakdown is available as Attachment 1.

VI. EXPECTED CHANGE IN THE SITUATION SHOULD ACTION BE DELAYED OR NOT TAKEN

Delayed action will increase public health risks to the local population/environment posed by asbestos fibers in the residential alleys and yards.

VII. OUTSTANDING POLICY ISSUES

Asbestos removals have been completed in Region 5, and around the country at numerous removal sites which were initiated under Section 300.415 of the NCP and in compliance with NESHAPS regulation under 40 CFR Section 61.150. This removal does not set a precedent or constitute a nationally significant issue. Because of the potentially broad impact of the vermiculite ore with high levels of amphibole asbestos mined from the Libby, Montana deposits, EPA Region 5 is coordinating with EPA Headquarters and other regions to assure a consistent approach to vermiculite issues.


VIII. ENFORCEMENT

For administrative purposes, information concerning the enforcement strategy for this Site is contained in the attached Enforcement Confidential Addendum.

IX. RECOMMENDATION

This decision document represents the selected initial Removal Action for the residential portion of the Western Mineral Products Site, located in Minneapolis, Hennepin County, Minnesota, developed in accordance with CERCLA as amended, and not inconsistent with the NCP. This decision is based on the Administrative Record for the Site. Conditions at the Site meet the NCP §300.415(b)(2) criteria for a Removal Action, and your approval is recommend. The total project ceiling, if approved, will be \$ 898,200. Of this, \$ 818,950 may be used for cleanup contractor costs. You may indicate your decision by signing below.

APPROVE: _____

for 
William E. Muno, Director
Superfund Division

Date: _____

7/21/00

DISAPPROVE: _____

William E. Muno, Director
Superfund Division

Date: _____

Attachments:

- Figure 1 - Site and Residential Sample Location Map
- Attachment 1 - Cleanup Contractor Costs
- Attachment 2 - Administrative Record Index
- Attachment 3 - EPA Toxicologist's Memorandum
- Attachment 4 - Confidential Enforcement Attachment
- Attachment 5 - Environmental Justice Analysis

cc: K. Mould, U.S. EPA HQ, 203G
D. Henne, U.S. Department of Interior, **w/o Enforcement Addendum**
J. Connell, Minnesota Pollution Control Agency, **w/o Enforcement Addendum**

Peder Larson, **w/o Enforcement Addendum**
Commissioner's Office
Minnesota Pollution Control Agency
520 Lafayette
St. Paul, MN 55155-4194

Rita Messing, Ph.D., **w/o Enforcement Addendum**
Minnesota Department of Health
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St. Paul, MN 55101

Rodney Sando, **w/o Enforcement Addendum**
Commissioner's Office
500 Lafayette
St. Paul, MN 55155-4037

BCC PAGE

WESTERN MINERAL PRODUCTS SITE

**HAS BEEN REDACTED
(1 PAGE)**

Attachment 1

Cleanup Contractor Costs

Personnel	\$ 114,000
Equipment	\$ 33,000
Disposal	\$ 84,000
Other Direct Costs	\$ 414,000
TOTAL	\$ 645,000

ATTACHMENT 2

**U.S. ENVIRONMENTAL PROTECTION AGENCY
REMOVAL ACTION**

**ADMINISTRATIVE RECORD
FOR
WESTERN MINERAL PRODUCTS SITE
MINNEAPOLIS, HENNEPIN COUNTY, MINNESOTA**

**ORIGINAL
SEPTEMBER 12, 2000**

<u>NO.</u>	<u>DATE</u>	<u>AUTHOR</u>	<u>RECIPIENT</u>	<u>TITLE/DESCRIPTION</u>	<u>PAGES</u>
1	09/11/00	Ecology and Environment, Inc.	U.S. EPA	Letter Report for the Residential Portion of the Western Mineral Products Site	118
2	00/00/00	Zintak, L., U.S. EPA	Muno, W., U.S. EPA	Action Memorandum: Request for a Time- Critical Removal Action Approval at the Western Mineral Products Site (PENDING)	



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

MEMORANDUM [9/6/2000]

SUBJECT: Exposure to amphibole asbestos fiber contamination in residential areas associated with the Western Minerals Products Site in Minneapolis, Hennepin County, Minnesota (Site ID # B5P2) poses an imminent and substantial endangerment to public health.

FROM: Mark D. Johnson Ph.D., DABT.
Regional Toxicologist

TO: Leonard N. Zintak, Jr., On-Scene Coordinator
Emergency Response Section 3

I PURPOSE

This memorandum addresses the rationale for determination of an imminent and substantial endangerment to public health posed by exposure to residual amphibole mineral fiber contamination at the former Western Minerals vermiculite processing facilities and in the residential areas containing waste material generated at the facility. The Western Mineral Products site received process vermiculite ore from the mine in Libby, MT by rail. Expansion of the raw ore occurred inside the building at 1720 Madison Street. Expansion was accomplished by heating the ore, usually in a dry kiln, to approximately 2000 °F, which boiled the water trapped in the crystalline matrix of the vermiculite, thus expanding the material by a factor of 10 to 15 fold. The waste product from the expansion process, also known as "Stoner Rock," was discarded at the loading dock into a large pile on the western side of the facility. A sign indicating that "Free Crushed Rock" was available was located above the pile. Over an estimated period of 40 yrs, local residents were reported to have taken this waste stoner rock material, to be used for a variety of purposes, including garden soil conditioning, driveway and yard fill, sandbox fill material, barbecue grill additive, and indoor insulation. Analysis of soil samples collected by EPA in the area where the former piles occurred show very high concentrations (~20%) of amphibole asbestos. Bundles of this asbestos material are extremely abundant in the surface soil near the loading dock on the west side of the facility.

Mineral fibers of this solid solution series are the focus of the present EPA investigation in

Libby. Amphibole mineral fibers of the tremolite-actinolite-richterite-winchite solid solution series (figure 1, hereafter referred to as 'tremolite, amphibole, or asbestos'), have been found in the Libby ore deposit. Occupational exposure studies of mine workers in Libby have demonstrated that exposure to these tremolite solution series fibers is associated with a significant level of asbestos-related disease (asbestosis, mesothelioma, lung cancer) and death of workers and family members of workers. Investigations of former workers at the Western Minerals site have indicated a significant number of cases of asbestos-related disease. In addition, several cases of asbestos disease have been reported in individuals who had no known asbestos exposure, but played as children in the stoner rock piles at Western Minerals. Those individuals also lived immediately across the street from the facility and could also have received exposure from airborne releases from the facility. In the interest of protecting public health, I recommend that appropriate actions be initiated to reduce or eliminate exposure to mineral fibers at the Western Minerals site and residences where the waste stoner rock material may be located.

II SUMMARY OF FINDINGS:

- I) Fibrous mineral fibers found in the vicinity of the former Western Minerals site are amphibole asbestiform in habit, are of respirable size, and are known to induce lung cancer, mesothelioma, and asbestosis upon inhalation exposure.**
- II The waste stoner rock material has been shown to be highly enriched for asbestos content. Locations where the waste stoner rock has been distributed are source areas for exposure to the residents. Physical disturbance of the material (e.g., driving a vehicle on a contaminated driveway surface, mowing a lawn containing this material, leaf collection activities by rake or leafblower on contaminated lawns, or wind action) can result into dispersion of asbestos fibers into the air.**
- II Amphibole material, apparently originating from contaminated driveways, has been observed to be distributed on adjacent surfaces, including alleys and residential streets. This dispersion into areas with higher traffic magnifies the potential for breaking the material into smaller and smaller sizes that would be more likely to become airborne and respirable. These are areas where there may also be a greater likelihood of human contact with the asbestos material.**
- II The contaminated soil and surfaces present an ongoing source of asbestos which can become entrained in air and can be transported on vehicles, pets, and shoes to homes and other areas of potential secondary human exposure.**

III BACKGROUND:

Vermiculite ore bodies on Zonolite mountain are associated with tremolite ranging in concentration to nearly 100% in selected areas (W.R. Grace). Although early exploration and mining efforts by the Zonolite Company focused upon the commercial viability of fibrous amphibole deposits found on Zonolite Mountain (DOI, 1928) no commercial production of tremolite is reported. Vermiculite was discovered in the Rainy Creek Mining District of Lincoln County, Montana in 1916 by E.N. Alley. Alley formed the Zonolite Company and began commercial production of vermiculite in 1921. Another company, the Vermiculite and Asbestos Company (later known as the Universal Insulation Company), operated on the same deposits (BOM, 1953). W.R. Grace purchased the mining operations in 1963 and greatly increased production of vermiculite until 1990 when mining and milling of vermiculite ceased. During early mining operations airborne fiber concentrations at the mine exceeded 100 fibers/cc in several job classifications (Amandus et al, 1987a). Airborne fiber concentrations in the residential area of Libby exceeded the present occupational Permissible Exposure Level (PEL) of 0.1 fiber/cubic centimeter established by OSHA 1994 (MRI, 1982; Eschenbach deposition). This exposure limit is considered to be associated with significant risk (3.4 additional asbestos-related cancers per 1000 individuals as per OSHA estimates) but is the practical lower limit of detection using phase contrast microscopy (PCM) as a measurement technique (OSHA, 1994).

Amphibole mineral fibers, including tremolite, are known to cause a variety of lethal and sub-lethal health effects as discussed below. Evidence of the lethal effects of exposure to tremolite from the vermiculite ore body on Zonolite Mountain is abundant. During the 1980s Lockey et al. (1984) and then the National Institutes for Occupational Safety and Health (NIOSH) (Amandus et al., 1987) conducted investigations of tremolite exposure and the morbidity and mortality of workers in various aspects of the mining, milling and refining process. These investigations, conducted during active vermiculite mining and processing activities in Libby, MT demonstrated multiple cases of lung cancer, mesothelioma, and asbestosis in workers exposed to variable concentrations of tremolite fiber at the mine. These findings were independently confirmed by concurrent investigations conducted by MacDonald et al., (1986).

Since the cessation of vermiculite mining and processing operations in Libby, local physicians and nearby pulmonary specialists have continued to identify individuals suffering from asbestosis, lung cancer and mesothelioma as a result of exposure to tremolite mineral fibers. One pulmonologist has seen more than 250 cases of asbestos-related disease from the Libby area (Whitehouse, 2000). While 142 of these individuals are believed to have been occupationally exposed during vermiculite mining operations, 29 individuals were secondarily exposed through household contact. Eleven cases are reported to have no connection with former mining or processing activities. These estimates are derived from a single physician working in the vicinity of Libby. Actual numbers of affected individuals are unknown and may be considerably higher.

IV ENDANGERMENT RATIONALE:

The rationale for determination of an imminent and substantial endangerment from exposures at the former Western Minerals site is:

- 1) Epidemiological studies workers from the Libby vermiculite mine have demonstrated that exposure to the amphibole asbestos fibers in this vermiculite ore and processing by-products of the vermiculite ore are associated with a variety of lethal and sub lethal health effects in former workers, families of workers, and in non-occupationally exposed members of the Libby community. In addition, a significant number of former workers at the Western Minerals vermiculite exfoliation facility have developed asbestos-related disease. Also, several individuals with only childhood exposure to the waste stoner rock material at Western Minerals have developed asbestos-related disease, with at least one death.
- 2) Detection of high levels of amphibole asbestos concentration (up to 20%) in samples taken in surface and subsurface soils at the site. These fibers represent a significant source of exposure to current workers and to nearby residents as a result of air dispersion of fibers. The highest levels were detected in areas immediately across the street from residences.
- 3) Detection of high levels of amphibole asbestos concentration (up to 80%) in surface soil and dust samples taken in residential yards, driveways, alleys, and streets within one block of the facility. Complete human exposure pathways (by inhalation and ingestion) have been positively identified by personal observation and empirical measurement;
- 4) The presence of amphibole asbestos material containing fibers of respirable and carcinogenic dimensions represents a significant health threat for human exposure.

A. Health Effects of Tremolite Asbestos: *Hazard Assessment*

Fibrous minerals found in association with the Libby vermiculite are members of a solid solution series of hydrated magnesium silicates in which varying amounts of iron (Fe^{2+}), sodium (Na^+), and aluminum (Al^{3+}) can substitute for calcium and magnesium in the solid solution. The solid solution series includes tremolite $[\text{Ca}_2\text{Mg}_5(\text{Si}_8\text{O}_{22})(\text{OH})_2]$, actinolite $[\text{Ca}_2(\text{Fe}^{2+}, \text{Mg})_5(\text{Si}_8\text{O}_{22})(\text{OH})_2]$, richterite $[\text{Na}(\text{CaNa})(\text{Mg}, \text{Fe}^{2+})_5(\text{Si}_8\text{O}_{22})(\text{OH})_2]$, and winchite $[\text{NaCa}(\text{Mg}, \text{Fe}^{2+})_4\text{AlSi}_8\text{O}_{22}(\text{OH})_2]$. Collectively with other minerals such as anthophyllite and amosite, these materials are referred to as amphiboles. In their fibrous habit, as identified in the ore body on Zonolite mountain, in association with un-expanded vermiculite, and in the exfoliated or expanded vermiculite product, these materials are generally referred to as asbestos

(Eschenbach, 1983) and are capable of causing significant human morbidity and mortality upon inhalation.

Health effect associated with fiber exposure from the Libby facilities is documented in a variety of technical reports (EPA 1980; EPA 1985; EPA 1986), and peer-reviewed studies. Lockey et al. (1984) demonstrated pleural radiographic changes and pleuritic chest symptoms in occupationally exposed workers with exposure to tremolite fiber from Libby. A detailed study of occupational exposure to tremolite during vermiculite ore processing documented significant increases of non-malignant respiratory disease and lung cancer in workers (Amandus et al., 1987a; Amandus and Wheeler, 1987). In a study conducted concurrently with the NIOSH investigation, McDonald et al. (1986) determined independently that workers in the mine experienced a "serious hazard from lung cancer, pneumoconiosis, and mesothelioma" as a result of exposure to tremolite fibers associated with the vermiculite processing.

In addition to effects associated with inhalation exposure to mineral fibers several studies indicate elevated risk of gastrointestinal cancer following exposure (Seidman et al., 1986; Ehrlich et al., 1991; Gerhardsson de Verdier et al., 1992).

B. Identification of Tremolite fibers at the Western Minerals site and Surrounding Residential Area: *Exposure Assessment*

Surface soil samples were analyzed by Polarized Light Microscopy (PLM), followed by Transmission Electron Microscopy (TEM) and Energy Dispersive X-Ray Spectrometry (EDX). Analysis of the samples by Analytical results indicated a significant percentage of samples with detectable tremolite-actinolite asbestos (Table 1).

Table 1: Summary of soil samples from Western Minerals and surrounding residential area

Location	# samples taken	#samples with detectable asbestos	% asbestos	asbestos type
Industrial property	23	16 samples: >1% 5 samples: trace	1-20%	tremolite-actinolite
Residential properties	9	7 samples: >1% 2 samples: trace	6-80%	tremolite-actinolite

TEM/EDX revealed abundant amphibole fibers of the tremolite-actinolite solution series.

Elemental analysis of the fibers showed the presence of a sodium peak, consistent with the mineral Richerite that is found in the Libby vermiculite ore. Fiber dimensions (length and width) have been shown to have an important impact on fiber toxicity (Berman et al., 1995; Blake et al., 1998; Castranova, 1998; Jianping, 1999). Clearance of fibers from the lung is inhibited and fiber toxicity is significantly enhanced when fiber length is greater than approximately 8µm (Blake et al., 1998). Analysis of fiber dimensions from these samples have indicated a significant proportion of fibers greater than 5 µm in length and aspect ratios (length to width) of 10-20:1.

The collection of residential samples focused on areas where the waste stoner rock was distributed for a variety of purposes. Analysis of this material indicates that it is highly enriched for amphibole asbestos, compared to vermiculite ore or the finished vermiculite insulation product. These samples were taken from areas such as yards, driveways, and alleys where there would be frequent human exposure. It would be expected that children would have an even greater exposure due to the nature of their recreational activities. Children are especially susceptible to mesothelioma due to their longer life expectancy relative to the latency of the disease (EPA, 1986).

The route of exposure that represents the greatest health concern is the inhalation of airborne fibers, dispersed from soil or concrete surfaces by the action of pedestrian or vehicular traffic, or by wind dispersion. Several measurements have been made to estimate air concentrations resulting from the handling of asbestos-contaminated soils and bulk materials, and may serve as a basis for estimating the potential air dispersion of asbestos fibers in the stoner rock in residential areas. Addison et al., (1988) generated airborne dust clouds from mixtures of soil containing asbestos concentrations from 1 to 0.001% by weight. Dust concentrations were maintained at 5 mg/M³ for 4 hours prior to measurement of airborne asbestos. The results indicated that, even the lowest soil asbestos concentrations (0.001%) were able to produce airborne asbestos concentrations which greatly exceed recommended human exposure limits. A similar investigation conducted by EPA (1994) indicated the likelihood of elevated airborne asbestos concentrations as a result of vehicular traffic along roadways constructed of serpentine rock. Though more realistic than the Addison study in terms of human exposure, the results of the EPA investigation also indicated significant risks associated with vehicle traffic along roadways containing 0.006 weight percent asbestos by TEM analysis.

In addition to the dispersion of fibers into the air, the frictional forces of foot and vehicular traffic on these surfaces would be expected to facilitate the breakdown of the amphibole asbestos bundles into smaller and more respirable fibers over time.

V CONCLUSION:

One of the main concerns about asbestos fiber exposure is that the dose is cumulative. Fibers of the dimensions identified in these samples have characteristics indicating that when inhaled they will penetrate deep into lung tissue and will persist due to their low clearance rate from the lungs. Studies have shown that tremolite asbestos is more stable than other forms of asbestos, which will further contribute to the accumulation of fibers in lung tissue. Children exposed to these fibers are of greatest risk due to the relatively long latency period for the asbestos-associated diseases, asbestosis, lung cancer and mesothelioma.

Unlike chemicals that can degrade in the environment, asbestos fibers from this material will persist and will continue to be generated due the presence of the relatively large mass of amphibole bundles. This evidence clearly indicates that the amphibole asbestos material in the residential soil at these locations is of a significant mass and fiber characteristics to pose an imminent and substantial threat to public health.

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ATTACHMENT 4

ENFORCEMENT ADDENDUM

**Western Mineral Products Site
Hobart, Lake County, Indiana**

August 2000

**HAS BEEN REDACTED
(2 PAGES)**

NOT RELEVANT TO THE SELECTION OF THE REMOVAL ACTION

ATTACHMENT IV

Cleanup Contractor Costs

**Western Mineral Products Site
Minneapolis, Hennepin County, Minnesota**

**HAS BEEN REDACTED
(1 PAGE)**

NOT RELEVANT TO THE SELECTION OF THE REMOVAL ACTION

ATTACHMENT V

ENFORCEMENT CONFIDENTIAL

**Western Mineral Products Site
Residential Facility
Minneapolis, Hennepin County, Minnesota
September 2001**

**HAS BEEN REDACTED
(2 PAGES)**

NOT RELEVANT TO THE SELECTION OF THE REMOVAL ACTION

ATTACHMENT 5

ATTACHMENT 5

Cleanup Contractor Costs

Personnel	\$ 404, 160
Equipment	\$ 96, 000
Disposal	\$ 336, 000
Other Direct Costs	\$ 78, 680

TOTAL	\$ 914, 840
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ATTACHMENT 6

ATTACHMENT 6

ENFORCEMENT ADDENDUM

**WESTERN MINERAL PRODUCTS RESIDENTIAL SITE
MINNEAPOLIS, HENNEPIN COUNTY, MINNESOTA**

**ENFORCEMENT CONFIDENTIAL
NOT SUBJECT TO DISCOVERY**

**HAS BEEN REDACTED
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NOT RELEVANT TO THE SELECTION OF THE REMOVAL ACTION